INVOLUNTARY REPOSSESSION

or

In the Steal of the Night

By John L. Russell 3

AUTOMOTIVE LOCKSMITHING

- How to bypass and remove locked ignitions on GM, Ford and Chrysler autos in two minutes or less
- How to read tumblers from door locks to make ignition keys with and without a keycutter
- Time-saving products
- Exploded lock diagrams
- "Fast" door-opening procedures
- How to pick locks
- Repossession tips and much more

Involuntary Repossession
or
In the Steal of the Night

JOHN L. RUSSELL 3

DEDICATED TO:

Joy Russell — Partner & Wife

WITH SPECIAL THANKS TO:

Bob Jane — Recovery Specialist & Friend
Chris Russell — Recovery Specialist & Brother
Bill Polero — Recovery Specialist & Friend
Paul Delany — Recovery Specialist & Friend
John Weaver — Recovery Specialist & Friend
Harry Forrest — Recovery Specialist & Friend
Dick Peecher — Recovery Specialist & Friend

PRODUCTION:

John L. Russell 3	Author & Art
Joy Russell	Typesetting
Nelson Zambito — Sprint Graphics	Typesetting
Patricia Campbell	Typesetting

Foreword

"Involuntary repossession" is the art of repossessing mortgaged chattel without the debtor's knowledge by stealth. In most states in the United States, repossession of mortgaged chattel by stealth is legal as long as there is no breach of the peace. Therefore, it is legal to repossess vehicles in the middle of the night without breaching the peace. After all, there is nothing more peaceful than a sleeping debtor. Because of the obvious dangers in conducting involuntary repossession it is necessary that the recovery specialist be able to effect involuntary repossession as fast as possible. The involuntary repossession methods and procedures discussed in this book should enable the professional to conduct automotive locksmithing and involuntary repossession in three minutes time or less on most American made autos.

Since the quickest method of performing one's job is the best method from the standpoint of service and profit, it is necessary for professional locksmiths and repossessors alike to know all the methods of performing same. The true professional analyzes his job thoroughly before undertaking it, thus, he is able to determine before he starts the best method to use.

In this book consideration is given to fast methods of automotive locksmithing and repossession. This manual deals with the basic techniques used by professional locksmiths and recovery agents the world over. It should be explained, however, that these methods are not limited. Personal cleverness and genius enable the professional to develop new and quicker techniques. Only standard methods are described here. Locksmiths and recovery specialists with an inventive mind will be able to find other methods of their own and improve their skill in the art. It is my hope that this book will act as a catalyst, motavating you to continue and improve your knowledge in the art of automotive locksmithing.

About the Author

John L. Russell 3 is a partner in the firm of Russell and Russell Investigators, a Tampa, Florida based investigative agency engaged in the business of investigative and recovery services and is a manufacturer and supplier of locksmithing, investigative and recovery products.

Russell began his career as a private investigator in 1969 at the age of nineteen. At twenty one, Russell became the youngest licensed private investigator in the state of Florida. He has an A.S. Degree in Criminology and is a Ni-Dan (second degree blackbelt) in Go-Ju-Ryu Okinawan karate. Russell is considered an expert in the fields of electronic surveillance and eavesdropping, electronic surveillance counter-measures, security analysis, automotive locksmithing, direct mail advertising and executive management. In 1977 at the age of twenty six, Russell became President of the Florida Association of Private Investigators, Inc., the youngest ever to hold that position. His firm is a member of the Florida Association of Private Investigators, the Private Detectives Association of New Jersey, the International Detective and Recovery Association and the Associated Locksmiths of America.

Table of Contents

Chapter I — Basic Locksmithing 5

Pin Tumbler Systems 5

Side Bar Systems 8

Impressioning and Lockpicking 10

Vehicle Entry 16

Chapter II — Ford and Chrysler 21

Door Lock Removal 21

Cutting Keys By Reading the Tumblers 25

Locksmithing Techniques for Ford Ignitions 28

Locksmithing Techniques for Chrysler Ignitions 40

Chapter III — General Motors, American Motors and Chrysler Tilt Wheel 48

Cutting Keys by Reading the Tumblers 48

Reading the Tumblers on the GM Door Lock 48

Reading the Tumblers on the American Motors Door Lock 53

Locksmithing Techniques for GM, AMC and Chrysler Tilt Wheel Ignitions 53

Chapter IV — General and Miscellaneous Information 62

Key Code Information 62

Motorcycles 64

Chapter I

Basic Locksmithing

To fully comprehend the procedures discussed in this book a basic understanding of locksmithing is necessary and the novice should pay close attention to this first chapter.

Generally, there are three basic types of lock systems that are differentiated by their tumbler usage. The three systems I refer to are; the pin tumbler system, wafer tumbler system, and the side bar system. The wafer tumbler system will not be discussed in this book, neither will another type, the warded lock system. Wafer tumblers are like those that are found in a Volkswagen and warded locks are like those that are found in handcuffs, padlocks, and the old home-type door locks that use a skeleton key.

Pin Tumbler Systems

The pin tumbler system is that that is used in Ford and Chrysler automobiles, in both the ignition and trunk lock mechanisms. Chrysler does have an exception in some of its older models, in that it used a wafer tumbler system, in the trunk lock.

The pin tumbler lock is composed of an inner cylinder and an outer cylinder. The inner cylinder is sometimes referred to as the plug, core or cam. Hereafter it will be referred to as the plug. The outer cylinder is sometimes referred to as the shell or just simply the cylinder. The outer cylinder will hereafter be referred to as the shell. A series of two piece tumblers are mounted in the shell of the lock and extend down into the plug. In both Ford and Chrysler cars, there are five tumblers. The bottom pin is called the bottom pin and the top pin is usually referred to as the driver. The tumblers are spring loaded, with the spring resting on top of the driver pin. The springs and pin are held in place by a spring retainer clip. Figure one depicts a lock cylinder without a key. Notice how the bottom pins proceed down into the plug. Figure two depicts a cylinder with a proper key from the front view. When the proper key is inserted, the bottom pin drops into the plug, and the driver pin rests on the plug. Figure three depicts a cylinder with a proper key from the side view. Notice that the proper key has raised or lowered the bottom pins and drivers so that the key can turn the plug within the cylinder. The point at which the driver pin and the lower pins separate is called the shear point. Figures four and five depict improperly cut keys, and their effect upon the pin tumblers.

PIN TUMBLER LOCKS

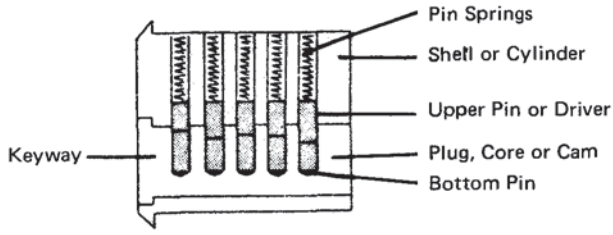


Fig. 1 Cylinder without Key

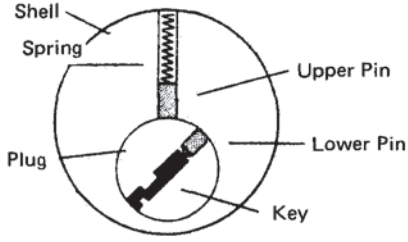


Fig. 2 Cylinder with Proper Key Front View

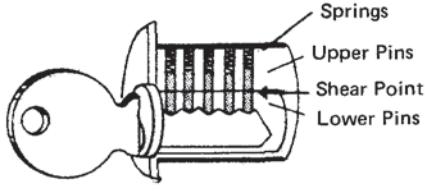


Fig. 3 Cylinder with Proper Key Side View

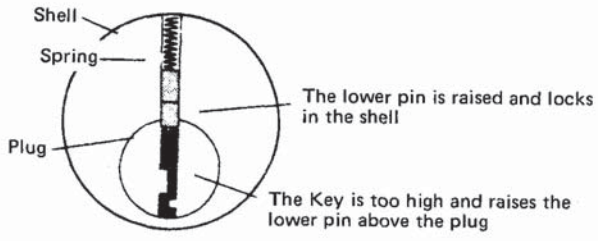


Fig. 4 Cylinder with Improper Key Cuts Too High

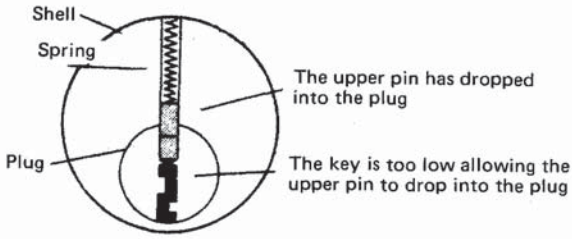


Fig. 5 Cylinder with Improper Key Cuts Too Low

The Side Bar System

The side bar system is that system which is used in General Motors and American Motors products. The basic construction of the lock is similar to all locks in that there is a plug and a shell. Here all the similarities stop. The side bar lock is a modified wafer system consisting of five wafer tumblers or side bar discs in the American Motors system and six wafer tumblers or side bar discs in the General Motors system. These side bar discs are mounted in the plug of the locks, are spring loaded and held in place by a spring retainer. Also mounted in the plug is the side bar. The side bar is spring loaded, and is staked into the plug. When the proper key is fitted into the plug, the side bar discs or wafers are raised, or lowered, so that the side bar slides into the side bar discs and holds them in a straight line. This action allows the plug to turn inside the shell, as the side bar without a proper key extends into a slot in the shell.

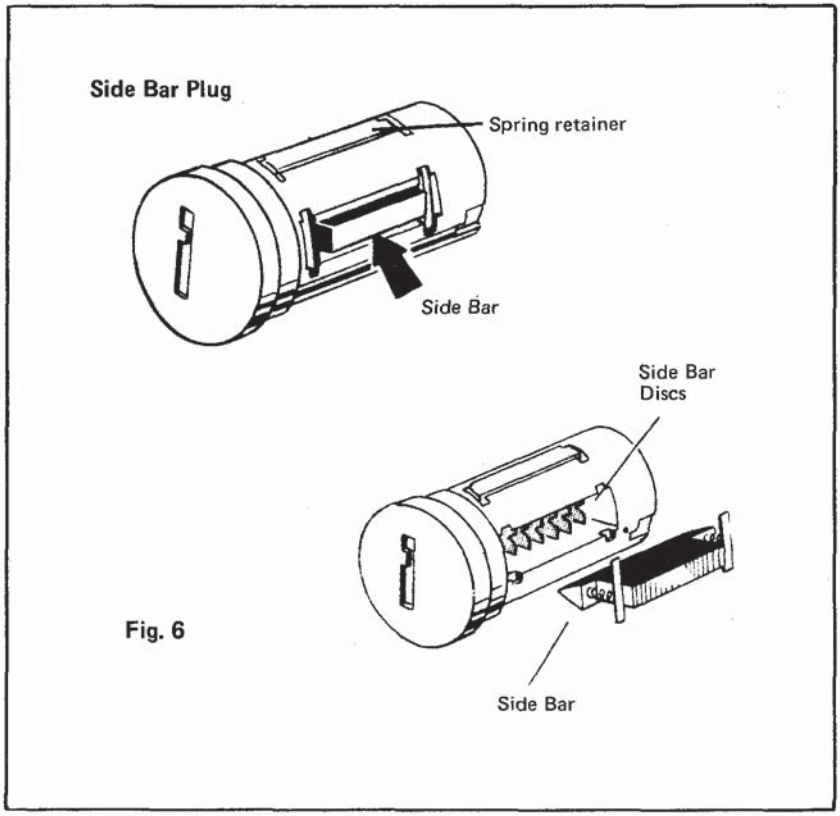


Fig. 6

Figure six depicts the side bar plug. Figure seven depicts a side bar lock cylinder with a key too high. Figure eight depicts a side bar lock with a key too low. Figure nine depicts a side bar cylinder with a proper key. Notice how the side bar has lined up with the side bar discs, allowing it to clear the slot in the shell, and thus turn the plug.

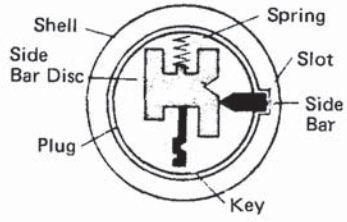


Fig. 7 Side Bar Cylinder with Improper Key - Too High

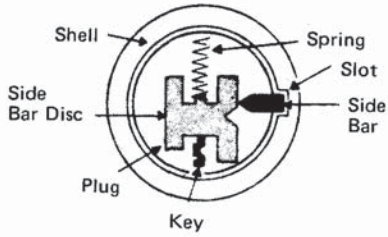


Fig. 8 Side Bar Cylinder with Improper Key - Too Low

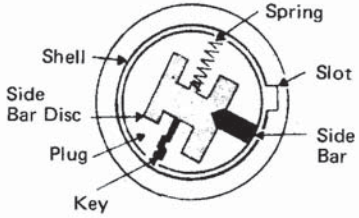


Fig. 9 Side Bar Cylinder - Proper Key

Impressioning and Lockpicking

Of the two systems previously discussed, pin tumbler and side bar, the pin tumbler is the easiest to pick and to impression. General Motor cars, that are of the side bar type, should not be attempted to be impressioned or picked, unless of course you are a lock master. To pick the General Motors side bar lock, a special series of picks are needed, and it takes a considerable amount of time.

One of the most important techniques in locksmithing is the making of cylinder keys by the impression method. If you learn how to do this, you can fit a key to almost any pin tumbler cylinder without having to take it apart or remove it from its location. This system, however, takes long hard practice until it is mastered.

The theory is that a pin tumbler will impress a mark in the blank as you twist it firmly in the plug and at the same time wiggle it up and down. This action will cause marks to appear on the top edge of the blade. When doing this, you should have the head of the blank firmly held in a C-clamp, or vise grips. Figure ten illustrates this technique.

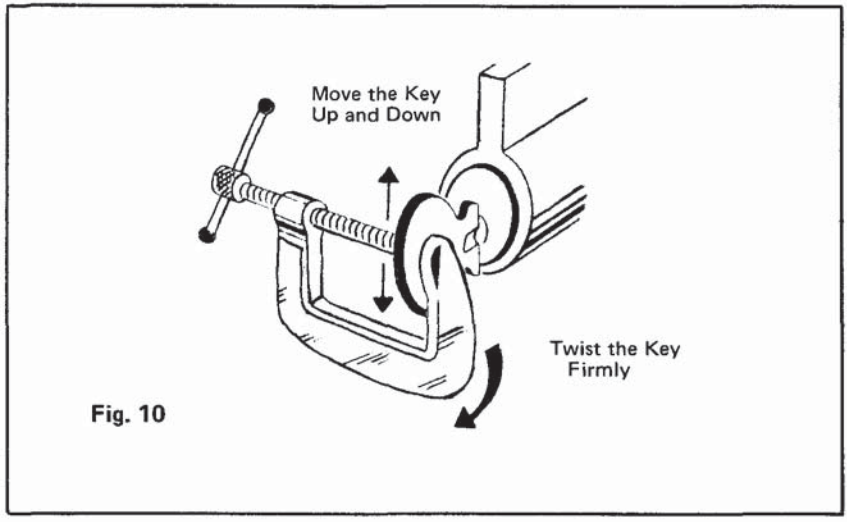


Fig. 10

The impression marks illustrated in figure eleven are produced because you bind the pins in the chamber as you twist the key side to side. The rounded points of the bottom pins dig into the top edge of the key blade when you move the blank up and down. As these marks appear the locksmith then files two or three strokes at a time with a round Swiss number four file, being sure to keep his cut smooth as he files only where the marks appear. If they disappear from one location, it means that the pin is no longer binding there and that he must examine the blank carefully to find where the next bind is occuring. Little by little, he files each cut as it marks until he completes the key, figure number twelve. This process takes good eyesight, and patience.

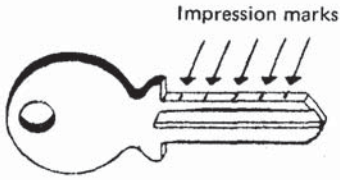


Fig. 11

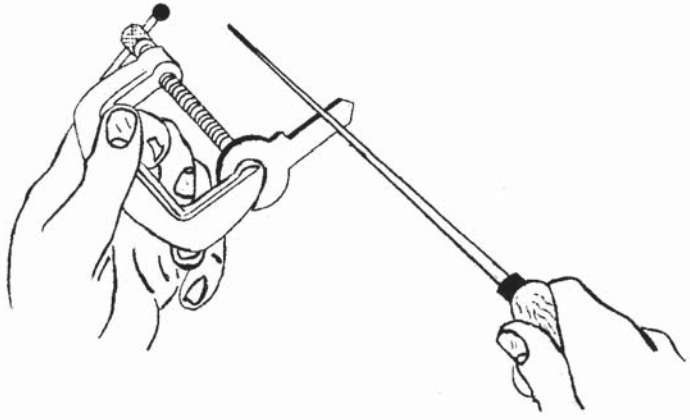


Fig. 12

Do not make your cuts too narrow, and do not leave any "fish hooks" or perpendicular edges on the slopes of your cuts. These may later prevent the insertion or the removal of the key. Widen your cut slightly to leave a small "platform" at the bottom. This is most important, otherwise, your pin may rest on the slope of the notch instead of the bottom. (Figure number thirteen.)

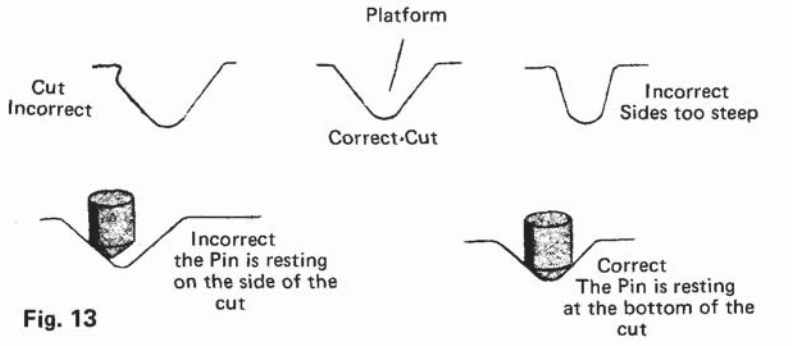


Fig. 13

Picking Locks

Nowadays, lock picking is generally confined to pin tumbler or wafer tumbler locks. The idea is to raise the tumblers to the top of the plug so that you can turn it open. Figure number fourteen shows one type of pick that is used.

Fig. 14

As you can see, a pick is just a piece of stiff, shaped wire that will enter the keyway of a plug which has just enough room to manipulate the tumblers. A turning wrench or tension tool is inserted into the plug of the lock and turned in the direction that the lock opens. This tension is maintained throughout the lock picking operation. (Figure number fifteen.)

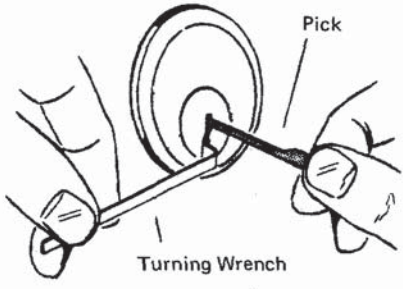


Fig. 15

Amateurs try to pick locks by running the pick in and out of the keyway very rapidly while applying turning pressure with the wrench, but this is very haphazard and an unscientific method. In addition, it saws or files the bottoms of the tumbler and often destroys the lock. The true way to pick a lock is to raise one tumbler at a time to the top of the plug and let it "hang" there. When all of the tumblers have been brought into this positon, the plug will turn.

The most important factor in picking is the use of the turning wrench. With the proper pressure, you can hold the tumblers that have been brought up to the surface of the plug while still having enough looseness to bring the rest of the pins up. To learn this method take a cylinder and remove the pins and springs from all but two chambers. Learn how to pick these two. Then add a chamber at a time until you have successfully picked the entire cylinder. Remember, this technique takes time and patience.

There are several types of pins, each of which makes the cylinder more secure against picking tools. One type is called "mushroom pins" and is found in Yale cylinders. The other type is "spool pins" and is found in Corbin, Ruswin, and other cylinders. The function of these pins is to hook themselves between the shell and plug and thus prevent lockpicking. (Figures sixteen and seventeen.)

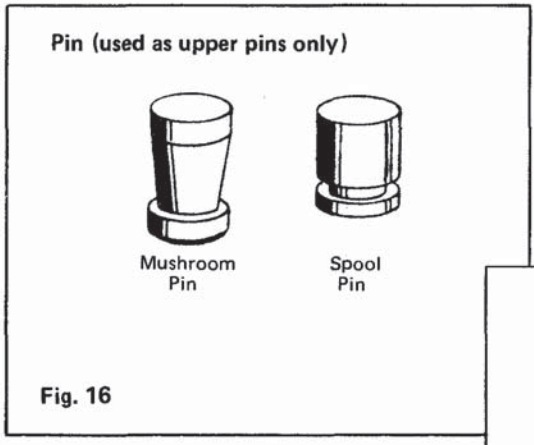
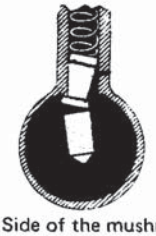


Fig. 16



The Side of the mushroom tumbler is hitting the edge of the cylinder

Fig. 17

Your author has successfully picked both trunk and ignition systems of Ford and Chrysler automobiles. In picking the ignition systems of both these automobiles, there is no need for the tension tool, as pressure can be placed on the chrome knob, or "butterfly" of each.

Other Hints For Lockpicking

1. Use a thin narrow pick, give yourself room to manipulate the pins.

2. Although unprofessional, first try to rake the lock. Worn shells and loose plugs often open amazingly quick this way.

3. Use a reciprocal motion in raking similar to the action of a piston rod in an engine.

4. Hold your pick like a pencil, let your fingers do some of the work as well as your wrist.

5. Steady your hand by resting your small finger against the door.

6. If you use the method of picking one pin at a time use moderately strong wrench pressure.

7. If you use the raking method use a very light pressure.

8. Use a torsion wrench that will not block the keyway so that the pick cannot be manipulated freely.

9. Make sure that the pick can enter above the wrench without raising any of the pins.

10. If the wrench blocks the keyway, try placing it at the top of the keyway.

11. A torsion wrench with a long leg to enter the keyway can be held more firmly and level than one with a short stubby leg.

12. Expertise and technique is developed only by practice.

Vehicle Entry

Getting into a vehicle can sometimes present a problem. Most recovery specialists rely on the "old coat hanger", which is perhaps the most commonly used tool. A screw driver can be inserted between the weather stripping and the glass on "coupe" type cars, and a coat hanger easily inserted. The coat hanger is bent, and pulls the knob up and thus unlocks the vehicle. On hard top cars, however, this is sometimes difficult if not impossible. Here, the forcing of a screw driver in between the door jam and the body of the automobile sometimes produces damage to the vehicle. Other times, the knobs have been removed, and all that is there is the treaded wire that the knob was once attached to. In these situations, locksmiths and recovery agents should utilize car opening tools that are available from your locksmith supplier. One of the best tools for hard top cars and those without knobs is the Slim Jim, as depicted in figure number 18. Note that the ends of the tool are

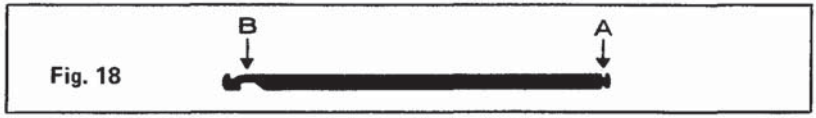


Fig. 18

designed differently to actuate the door lock mechanism by pulling up on same with the "A" end or by depressing the mechanism with the "B" end.

Slide the appropriate end between the glass and the weather stripping of the door so that it can catch the door latch mechanism that is directly behind the door lock cylinder. By pushing down on the latch (figure number 19) it is possible to release the locking mechanism on General Motors and Chrysler cars. For Ford cars, the tool should be hooked over the latch (figure number 20) and pulled upwards to release the lock. On some models where the door frame is curved, it is necessary to bend the tool slightly so that the tip reaches the latch properly. Whether to push or pull the locking mechanism as described above differs from model to model and year to year on Ford, Chrysler and General Motors cars.

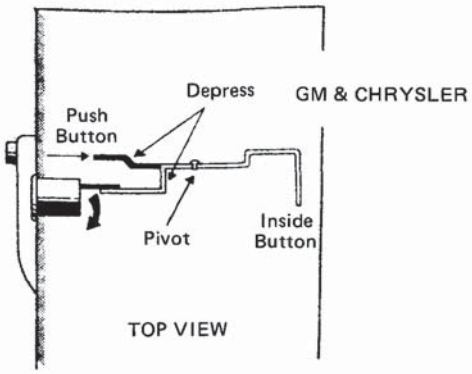


Fig. 19

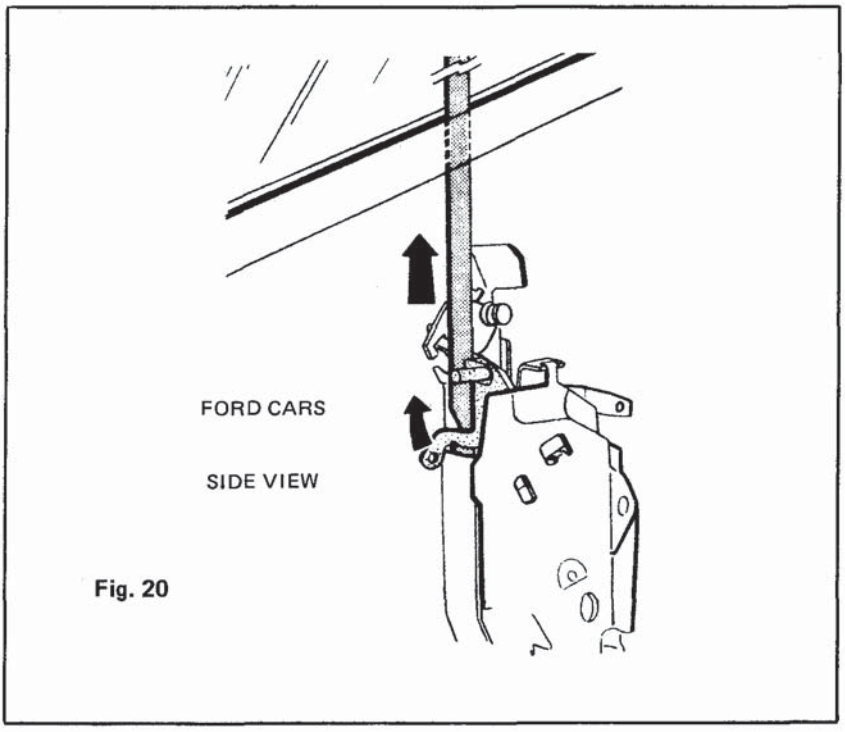


Fig. 20

When using the Slim Jim, always probe around the door lock, where the lock button is located is not significant. Seldom will the lock mechanism be contacted the first time. Movement of the door lock button will indicate that you have properly contacted the door lock mechanism. If contact is not made after probing with the Slim Jim, remove the tool and change the bend in same and try again. Never use force! If force is required, proper contact has not been made. Should the tool become caught in the door, work it from side to side gently until it is free. Some General Motors and Ford products have two layers of weather stripping, one on top of the other. These must be separated and the tool inserted between them. The following are a few hints on which end to use for specific model cars.

American Motors - For late models, use the "A" end of the Slim Jim without a bend in same (use a slight bend on two door hard tops). Insert the tool straight down on the door lock and push to release. For Gremlin and Hornet, insert the tool in front of the door lock slightly and angle down toward the door lock. Push to release.

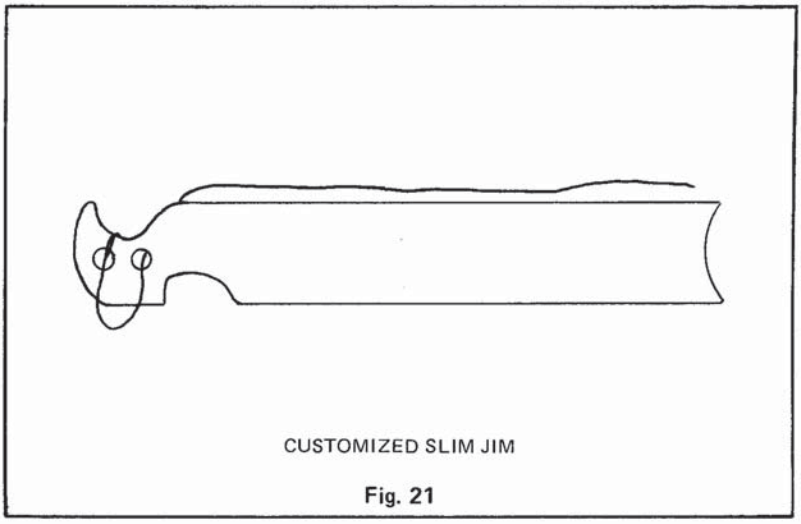
General Motors - On late models, use the "A" end with a slight to medium bend. Insert the end over the top of the door lock and push to release. On older models and some hard tops use the "B" end with a slight bend. Insert the tool slightly in front of the door lock and pull to release.

Chrysler - For almost all Chrysler vehicles use the "A" end with a slight bend. Insert the tool in front of the door lock and push to release. Chrysler products with electric door locks are serviced the same except that the lock actuator is short and the button moves only slightly. Occasionally try to open the door to see if it is unlocked.

Ford - For most late model Fords, use the "A" end of the tool with a slight bend inserted in front of or directly above the door lock and push to release. Use the "B" end with a slight bend to service economy cars such as the Maverick, Comet and on some older models. Pull to release.

You may find some inconsistancy when using the above methods, but for the most part, they are accurate.

You can use the Slim Jim to open windows in the same manner as you would with a coat hanger by slightly customizing it. Drill two holes in either the "A" or the "B" end and attach a piece of piano wire, monofilament fishing line or heavy twine as indicated in figure number 21. To operate this tool, place the noose over the lock button and pull same tight by pulling it toward you. At the same time, pull up on the Slim Jim to actuate the lock button.



CUSTOMIZED SLIM JIM

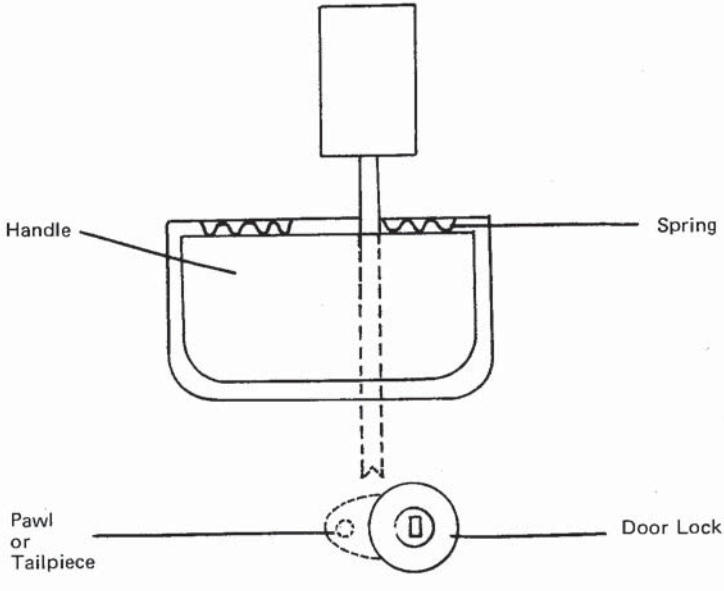
Fig. 21

Figure number 22 depicts a handy tool that can be made out of a flexable metal rod. First flatten the end of the rod, and they drill a hole in same. Attach a piece of string, piano wire or monofilament fishing line in the fashion of a loop. To use the tool, place the loop around the lock button and turn the rod until the loop becomes tight. Pull up on the rod to release the button. This tool works especially well when the lock button has been removed and only the threaded wire is exposed. Make sure that the length of the rod you use is long enough to service vehicles having the door lock buttons in the middle of the door.

LOOP OPENER

Fig. 22

Opening Corvettes can sometimes be a problem and there are two tools to service this type door lock. The first is similar to the Slim Jim and is used in



'VETTE OPENER OPERATION

Fig. 23

the same fashion. This tool is thinner in width than the Slim Jim and is curved like the letter "J". The tool is inserted between the weather stripping above the door lock and comes to rest on the top of the plastic cover over the door lock. By firmly pressing down the lock is released. The second tool, you can make for yourself out of heavy gauge sheet metal or banding material. The tool should be 10" in length, 1/16" thick and 1/4" wide. Use a piece of wooden dowling for a handle. Cut a notch in the "opening end" of the tool so that it will not slip off of the door lock mechanism during operation. To operate this tool, slightly depress the door handle so that you can fit the tool between the hinge at the top of the handle, directly above the door lock. By depressing the tail piece of the door lock, you can release the lock (figure number 23).

There are many types of car opening tools available from your locksmith supplier that are a good investment. Figure number 24 depicts several car opening tools available and their various functions.

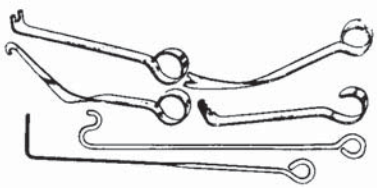
CAR OPENERS

Fig. 24

The tool above opens Voldswagen vehicles by inserting it between the weather stripping on the vent window and by pulling the vent window knob open. With the vent window open, the door can be opened by depressing the door handle on the inside of the vehicle.

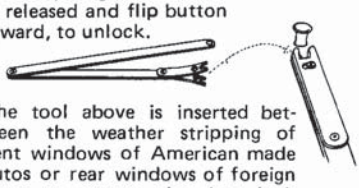
This tool will open most General Motors hardtops, that have the inside locking button located near the end of the door panel. Not for "long-reach" styles as used on late models.

The tool above is inserted between the weather stripping between the front and rear windows on coupes or under the weather stripping of the side vent windows. This three piece section tool is 62" long and actuates the lock button on the opposite door of the vehicle.



Four of the opening tools above are used to open American made autos with vent windows in the same manner as the VW opener. The other two tools are used to roll the window down or depress the door lock handle on the inside of the car.

Closed prongs, ready to be released and flip button upward, to unlock.



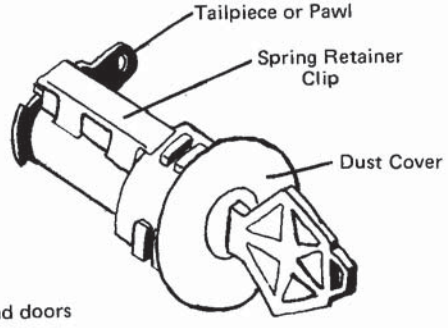
The tool above is inserted between the weather stripping of vent windows of American made autos or rear windows of foreign autos to actuate the door lock button. The notched prongs spring upward to unlock the door.

Chapter II

Ford and Chrysler

Door Lock Removal

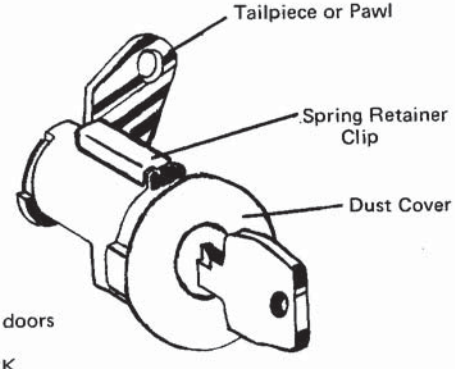
A standard method of automotive locksmithing is removal of the door lock so that a key may be made by reading the tumblers. Figure number 25 is a door lock cylinder for Chrysler products and figure number 26 is the door lock cylinder for Ford products.



For right and left hand doors

CHRYSLER DOOR LOCK

Fig. 25

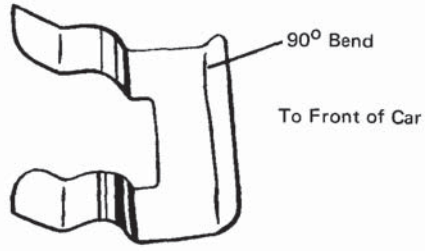


For right and left hand doors

FORD DOOR LOCK

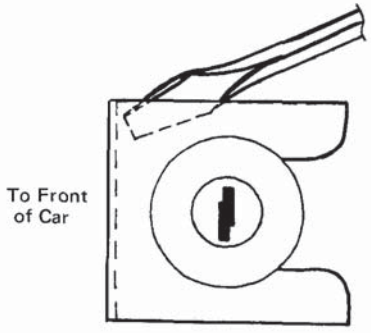
Fig. 26

Door lock cylinders in Ford, Chrysler and General Motors cars are retained by a door lock retainer clip (figure number 27). In most cases, the ninty degree bend is toward the front of the car, so the clip can be removed by pushing the clip off with a screw driver (figure number 28).



DOOR LOCK RETAINER CLIP

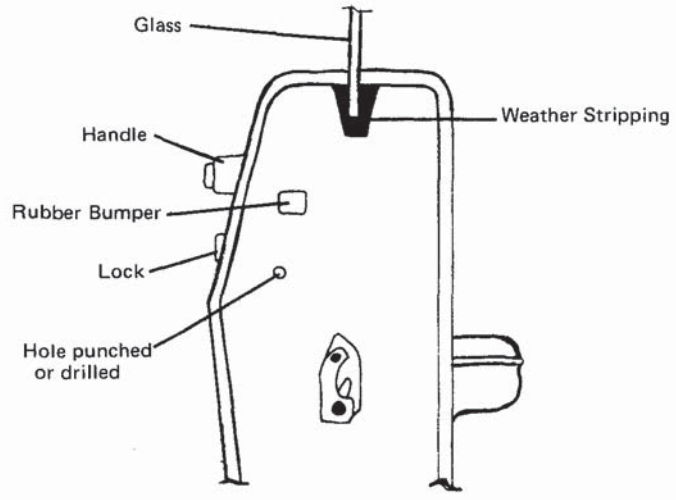
Fig. 27



RETAINER CLIP REMOVAL

Fig. 28

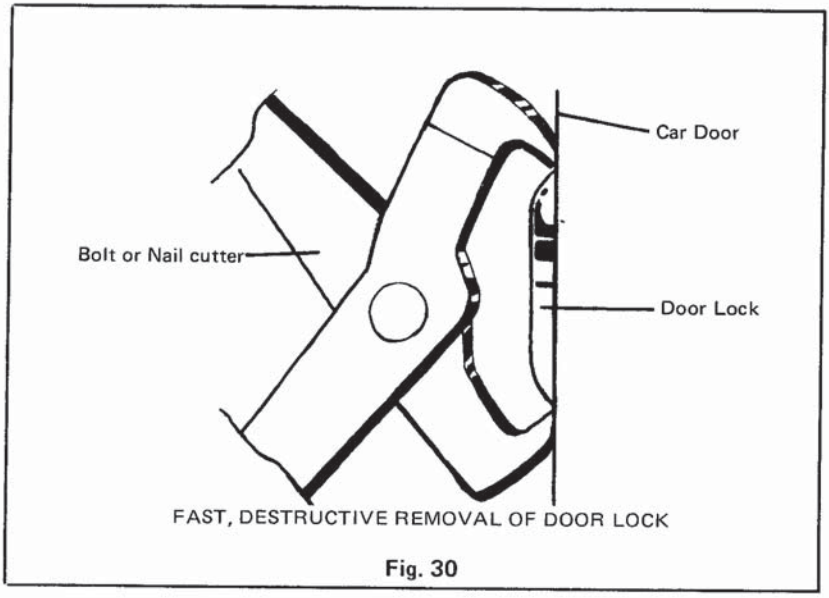
Take a long screw driver of approximately eighteen inches, and remove the clip by the following methods; place the screw driver through the weather stripping around the glass window on the inside of the door jam and push the clip off, or remove the rubber bumper on the inside on the jam insert your screw driver and push the clip off, or if the particular car has no weather stripping or rubber bumper – take a punch and a five pound hammer and punch a hole inside the door jam – then insert the screw driver and push the clip off. The slight amount of damage that this does to the car is usually not noticable (figure number twenty nine).



DOOR LOCK REMOVAL WITHOUT DISASSEMBLY OF DOOR PANEL

Fig. 29

A quick method of removing the door lock, that does produce some damage to the vehicle, is by using a pair of bolt or nail cutters. Place the bolt or nail cutters around the outside of the door lock (figure number twenty eight), and by using a prying method and a up and down-side to side motion, pull the door lock out. The up and down-side to side method bends the door lock retainer clip and allows you to remove the cylinder. This method works well on Ford and General Motors cars, but does not work on Chrysler. The Chrysler door lock cylinder is of light pot metal and has a tendency to bend under the pressure of the bolt or nail cutters. By using the bolt or nail cutters, it is possible to remove locks from Ford and General Motors automobiles in less than three seconds. Bolt cutters can be purchased from Sears for about $6.00.



FAST, DESTRUCTIVE REMOVAL OF DOOR LOCK

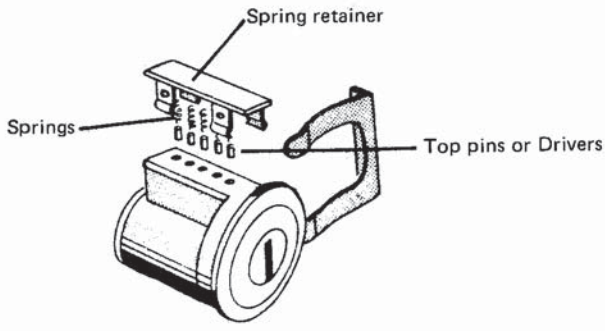
Fig. 30

On 1969 General Motors products, the key code to the ignition and door lock is on the door lock. On nine out of ten Ford models, the key codes are on the door lock. Very rarely are the key codes found on the door locks of Chrysler cars, however, your author has found them on the driver's side of the vehicle on 1969 and 1970 models. When you find the key code on the door lock, it is very easy to cross the code and cut the key with a key cutter. If you do not have a key cutter, you should seriously consider getting one.

Previously in this section you were advised that the ninty degree bend most often faces the front of the automobile. In some cars, however, this is not always correct. Thunderbirds and Lincolns, often have the door lock clip exposed. In other words, if you open up the door, you will see the clip on the inside of the jam. The door lock cylinder can be removed easily with the use of a screw driver in these cases. On some Chrylser model trucks, the door lock clip faces down. This is true of 1975 Dodge "Power Wagon" trucks. In this case, it is quite easy to roll the window down and push the clip off with a screw driver by putting it between the glass and weather striping at the top of the door.

Cutting Keys by Reading Tumblers

To cut a key by removing the tumblers on pin tumbler locks, several methods may be employed.

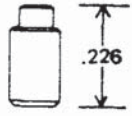
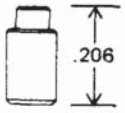
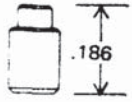
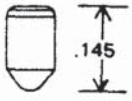
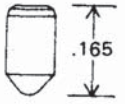
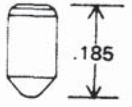
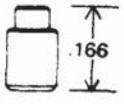
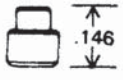
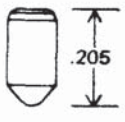
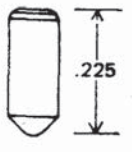


DISASSEMBLY OF DOOR LOCK

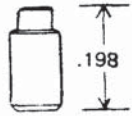
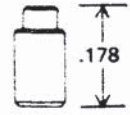
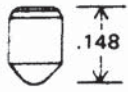
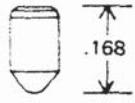
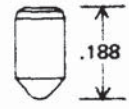
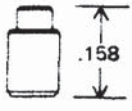
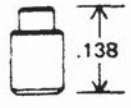
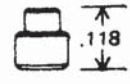
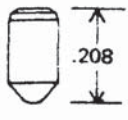
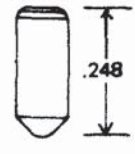
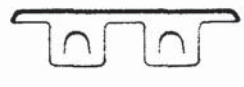
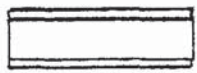
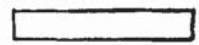
Fig. 31

First remove the spring retainer cap, and the springs. Be careful that you do not lose any of the springs, or turn the cylinder upside down so that the tumblers are lost. Next use a paper clip that is bent at a ninty degree angle or the curved hook pick that is with most pick sets, to remove the bottom and driver pins. Start from the front of the lock at the keyway and work to the back. As you remove each pin set, place them into a small container separately and in order so that you may be able to remember in which order they appeared and replace them if necessary (figure number twenty seven). Next read the cuts of the tumblers by the use of the caliper or micrometer. Figure number twenty eight shows the length of Ford tumblers, and figure number twenty nine shows the length of Chrysler tumblers. After practice, you will be able to determine the length of the tumbler sets by eye. In figure number twenty eight, the bottom tumbler of a number one cut is approximately the same length as the top tumbler (driver) of a number five cut. The top tumbler (driver) of a number one Ford tumbler is approximately the same length as the bottom tumbler of a number five cut. The number three cut bottom pin and driver pin are approximately the same length. In Ford products, there are only five cut depths, while in Chrysler there are six depth cuts. There is little visable difference between Ford and Chrysler pin sets to the naked eye, except the number six cut, and the diameter of Chrysler tumblers is smaller than Ford's.

Ford PIN TUMBLER SYSTEM

Top Tumbler No. 1 	Top Tumbler No. 2 	Top Tumbler No. 3 
Bottom Tumbler No. 1 	Bottom Tumbler No. 2 	Bottom Tumbler No. 3 
Top Tumbler No. 4 	Top Tumbler No. 5 	
Bottom Tumbler No. 4 	Bottom Tumbler No. 5 	
Springs 	Retainers 	Fig. 32

Chrysler PIN TUMBLER SYSTEM

Top Tumbler No. 1 	Top Tumbler No. 2 	Top Tumbler No. 3 
Bottom Tumbler No. 1 	Bottom Tumbler No. 2 	Bottom Tumbler No. 3 
Top Tumbler No. 4 	Top Tumbler No. 5 	Top Tumbler No. 6 
Bottom Tumbler No. 4 	Bottom Tumbler No. 5 	Bottom Tumbler No. 6 
Springs 	Retainers 	Retainers
Retainers 	Retainers 	Fig. 33

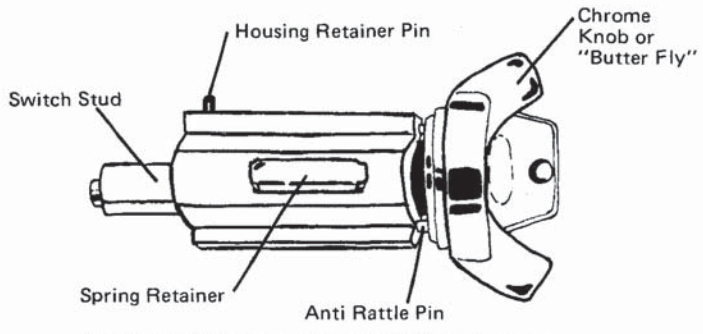
Another method of decoding the key is by placing the bottom pins one at a time back into the cylinder, and using a depth key to determine their length. For Ford lock systems, a set of five depth keys are needed. Each key has a series of number one cuts or number two cuts, etc., on up to the number five cut. Chrysler depth keys utilize six keys, each one having a number one cut or a number two cut or a number three cut, etc., on up to the number six cut. Depth keys also indicate the spacing between the tumbler cuts, which would be very helpful in impressioning keys. The method of determining the cuts would be by placing the bottom pin back into the lock cylinder, and testing each depth key until the plug moves freely in the cylinder. Care must be used to go from the number one cut depth key to the number five cut depth key in progression. Otherwise, you could read the key incorrectly. It would also be helpful if you used a paper clip to push down on the bottom pin while the key is inside to make sure that the bottom pin is seated properly on the depth key.

It is also possible to compare pin tumblers with those that are supplied in a pinning kit. A pinning kit has all of the items indicated in figures twenty eight and twenty nine, and the tumblers are clearly marked so that comparison can be made with either the driver pin or the bottom pin.

After decoding the key, it is a very simple process of cutting the key with a key cutter, or if you have no key cutter, by using a blank and a depth key to cut the proper code. Using the depth key and a blank, use a pair of vise grips to hold them together while you make impression marks with a number four Swiss file. After you have your impression marks file the marks to the depth desired, by comparing them with the depth keys every so often.

Locksmith Techniques For Ford Motor Ignitions

Late model Ford Motor products have three ignition systems. Figure number 34 depicts the Ford, Mercury and Lincoln ignition locks from 1970 through 1973½. Figure number 35 depicts the ignition Ford produced on May 14,



FORD, MERCURY, LINCOLN IGNITION LOCK
1970 to 1973½ (5/14/73)

Fig. 34

1973. There are several differences in these two locks. The 1973½ through 1976½ model has a square shaped switch stud where the pre-73½ model has a triangular shaped switch stud. The cylinder retaining pin on the 1973½

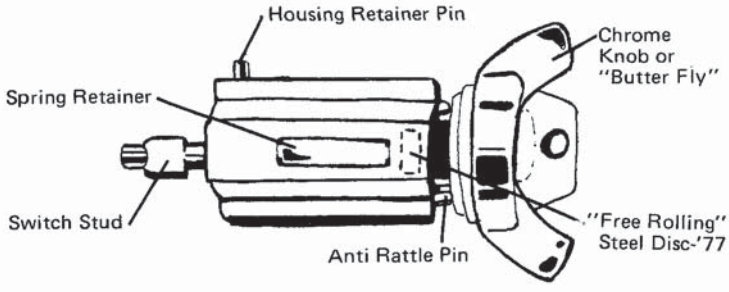


Fig. 35 FORD, MERCURY, LINCOLN IGNITION LOCK (5/14/73) 1973½ to 1976½ (2/1/76)

through 1978 lock has twice the circumference of the pre-73½ models.

These two Ford ignition locks can be removed without too much difficulty by utilizing the slammer, also referred to as the slide hammer, slugger or body dent puller (figure number 36). The model depicted is manufactured by Snap

SLAMMER, SLUGGER, SLIDE HAMMER OR BODY DENT PULLER

Fig. 36

On Tools. If you can find them, 3/8 by 2" hex head screws are recommended as the extra ½" length allows you to use the slammer on General Motors ignitions. More about that in the next chapter.

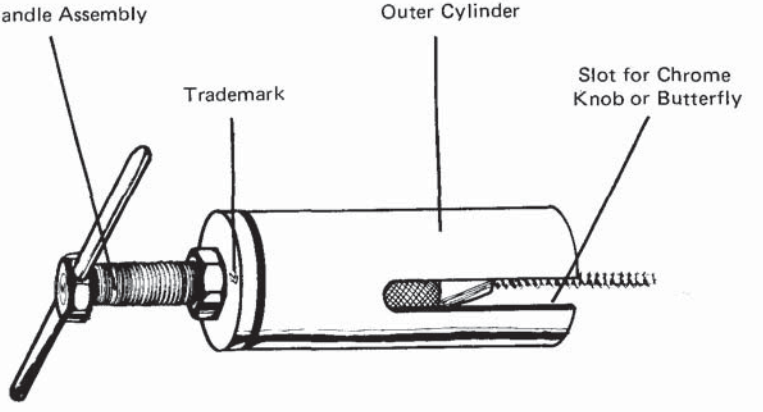
The method of removing Ford Motor locks with the slammer is, quite simply, to screw the slammer into the keyway of the ignition approximately ½" and pull back on the slide hammer with force. A couple of raps should take out

the 1970 through 1973½ ignitions and a few more raps will take out the 1973½ through 1976½ ignitions. Occasionally, the chrome knob or butterfly will come off leaving the ignition still intact. If this should happen, simply remove the left anti-rattle pin (the one closest to you as you sit in the driver's seat) and screw the sheet metal screw of the slammer into the cavity. I make this suggestion because it is rather difficult to screw the screw into the keyway of the core once the butterfly is removed and also because the retainer pin situated at the rear of the lock is directly behind the brass anti-rattle pin that has been removed. Inserting the screw into the anti-rattle pin cavity applies direct contact to the housing retainer pin and therefore, makes it easier to extract the ignition. The slammer does make quite a bit of noise, and it is advisable that the windows be rolled up on the vehicle to deaden the sound. Some people put rubber washers between the slide hammer and the impact nut to deaden the sound, but I feel this is unadvisable as you lose "impact". Once the lock is removed, insert a flat head screw driver into the "star gear" cavity and turn clockwise to start or install a new lock.

It is possible to by-pass the 1970 through 1973½ Ford, Mercury and Lincoln ignitions by the use of a "twist key". The twist key is made by taking a brass chrome plated blank (it is important that it be made of the strongest material possible and a good plated key will suffice) and making a series of number three cuts on one side of the blade. Utilize your key cutter to cut the blank or use your depth keys and a number four Swiss file. You may wish to ask your local locksmith to cut these for you. Only cut one side of the blade as this will make the blank stronger. Insert the blank into the Ford lock with the cut portion toward the tumblers inside the lock (in Ford products the tumblers are usually situated on the bottom of the keyway and the key would be inserted with the cut portion downward). After the key has been inserted into the lock, take a pair of channel locks and grab the "ears" of the chrome knob or butterfly and the key. By using constant, steady force, twist the key to the "start" position. It is important that your channel locks be able to hold both knobs and the key and that only a steady, constant force be used. If you fail to grab both knobs and use a jerky twisting method, it will break the key and the chrome knob will come off. If this happens, remove the anti-rattle pin and remove the ignition with a slammer or Ford extractor. The twist key method is possible because of the construction of this Ford lock. The cylinder is constructed of pot metal and the number three cuts push the pin tumblers up into the plug housing. Under torque, the tumbler housing and the tumblers themselves bend so that it is possible to turn the plug. Occasionally, the twist key method makes the ignition stick and the starter will continue to turn after the engine has been started. When the twist key makes the ignition stick, back the key towards the "off" position and you should have no further problems. The twist key method does not work

well on the 73½ through 76½ year ignitions as the chrome knob or butterfly is only lightly staked on the plug flange. Occasionally, it will work, especially if you turn the key only to the "on" position and do not try to push it to the "start" position. In the "on" position the lock on the steering wheel is released. Start the car by hot wiring or tow it.

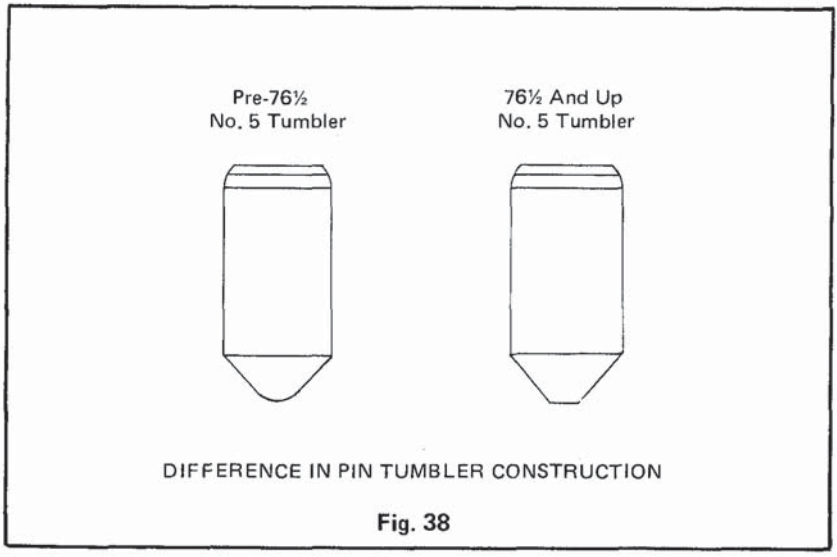
Perhaps the easiest method of removal of the 70 through 73½ and 73½ through 76½ ignitions is by utilizing the Ford Ignition Remover Tool. To use the tool, an outer cylinder is placed over and around the chrome knob or butterfly, a T-Handle assembly with a self-tapping screw is then screwed into the ignition and the lock is then ratcheted out. I will give you a word of caution on purchasing Ignition Extractors. There are several on the market, and the majority of them are poorly constructed or too time consuming to utilize. Shop around carefully and purchase only those tools that are guaranteed and in the middle or high price range. There are several Remover Tools that are in the lower price range and you will get exactly what you pay for. Below is the Ford Ignition Extractor that I have developed. It operates on the same principal as the slammer. It is easy to operate, quiet and can be used by locksmiths as a "nose puller" on safety deposit boxes. This model decores hundreds of other locks including foreign automotive ignitions.



FORD "Z-TOP"® IGNITION EXTRACTOR BY RUSSELL & RUSSELL

Fig. 37

On February 1, 1976, Ford came out with a new ignition. In 1977 they altered this ignition somewhat. The new ignition is very similar to the 73½ through 76½ ignition in figure number 35, but there are some differences. Not all 1976 cars have this type ignition and it depends upon when they were produced. Cars produced after February 1, 1976 may have the new ignition. Economy cars, such as the Pinto, Maverick and Mustang II will more than likely have this type of ignition. It is very difficult to slam these ignitions or remove them by using a Ford Remover Tool. Using the slammer method, it took over fifty pulls of the slammer to remove the ignition! While using the Ford Tool, I had to replace the screw five times before the lock would come out! The first difference in the new 76½ to 78 lock is the construction of the pin tumblers. They are now constructed of a slightly harder metal alloy instead of brass to impede the "twist key" method and drilling. The bottom pin tumbers on the pre-76½ Ford locks have a slight point at the tip. The new alloy number five bottom tumblers have a flat place on the tip to impede "rake" picking (refer to figure number 38). Cutting a key for these new locks

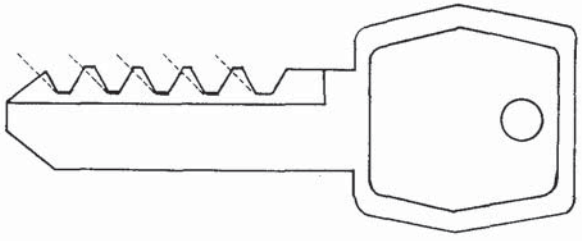


DIFFERENCE IN PIN TUMBLER CONSTRUCTION

Fig. 38

in the regular methods will not work because of the flat spot. In fact, Curtis Industries has come out with a new model Ford key cutter for cutting 76½ through 78 keys. However, it is still possible to cut a key with your old cutter by making the slopes or hooks of the cuts less acute (see figure number 39). The flat spot on the pin tumber does not ride up the slope as well as the pointed tumbler does. You will find that the key will work rather well, but will not come out of the keyway without using a pair of pliers. To combat this, after you have cut the key on your key cutter, recut it by moving it approximately 1/16" backward so that the cuts overlap making the slopes less

acute. The key should then work perfectly.

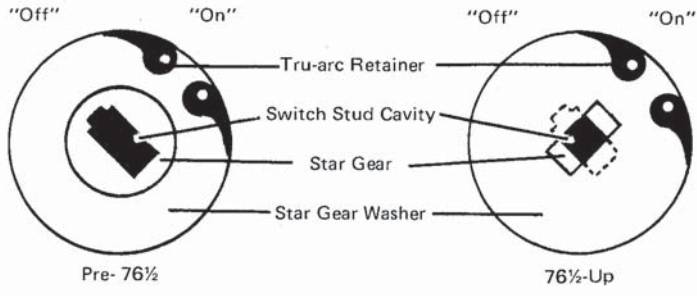


PROPER KEY CUTTING FOR 76½ UP

Fig. 39

The next difference is the spring retainer and spring retainer housing. The spring retainer is similar to those found on Dodge Colt vehicles depicted in the bottom left square of figure number 32. Incidentally, these Chrysler retainers can be used when servicing this type of lock. The spring retainer housing is recessed into the shell of the lock and is not exposed as the pre-76½ and up models. This tends to strengthen the spring retainer housing and impedes the twist key method. On the newer 1977 and up ignitions, (those 76½ model locks in 1976 Fords do not have this) there is an armour plated, "free rolling" steel disk situated in the shell or outer cylinder just before the spring retainer (refer to figures number 31 and 36). This "free rolling" steel disk impedes drilling the tumblers at the shear line as the tip of the drill causes the steel disk to rotate when attempting this. The core of locks possessing steel disks are slotted and the steel disk fits into this slot. This retains the core in the outer cylinder so that the core cannot be removed without the shell and impedes "shimming".

The switch stud of the 1976½ and up model ignition is similar to the 1973½ through 1976 model depicted in figure number 35. The only difference is that the switch stud is slightly longer. In years previous to the 76½ model, the switch stud of the ignition fit into a "star gear" at the base of the housing cavity that was retained by a circular washer. The 1976½ and up model has a slotted washer that retains the star gear that will not allow the switch stud to pass through it unless it is in the "on" position. In the "off" position,



DIFFERENCE IN "STAR GEAR" SWITCH STUD CAVITY

Fig. 40

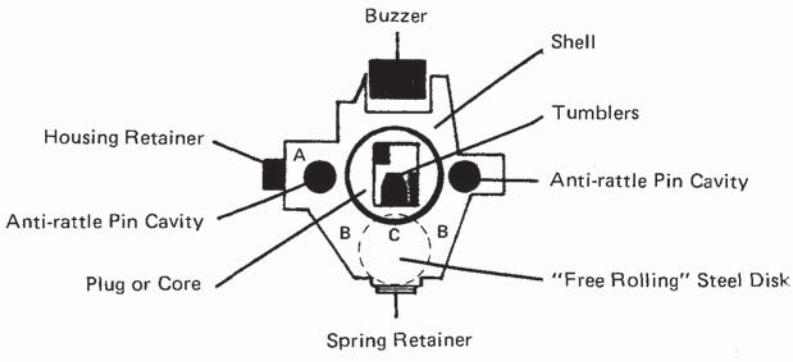
the slotted washer will bind against the switch stud (refer to figure number 40). This double retention of the lock is what makes it so difficult to remove with a slammer. If you do succeed in slamming the ignition out, in all probability the switch stud will have broken off inside the slotted washer. In most cases, the slotted washer will be bent and the star gear will have slipped off track making it impossible to start the vehicle. In some cases the star gear does not slip off the track and if the broken portion of the switch stud is long enough it is possible to start the ignition by turning the broken switch stud to the "start" position. If you are lucky the car will start. If not, you may have been lucky enough to have at least released the wheel from the "locked" position and if so, can hot wire the car or drag it off. If the wheel is still in the locked position, it will be necessary to remove the slotted washer, the star gear and the broken switch stud. The slotted washer is retained by a tru-arc retainer that can easily be removed with a pair of tru-arc pliers or sharp pointed needle nose pliers. Once you have removed the slotted washer and the star gear, you will be able to see the track that the star gear pushes forward to start the vehicle. You can push this track forward with a screw driver to start the vehicle. Care should be taken when replacing the star gear that it be on the track correctly. To align, push the track backwards to the "locked" wheel position and match the threads of the track to the star gear. A little trial and error should enable you to determine the correct position.

Make sure it is correct before you replace the ignition or you will have to start all over again by removing the ignition. Because 1976 Ford products could have either the 73½ through 76 or the 76½ through 78 ignition, it would be wise to look through the keyway at the tumblers. If the tumblers are a dull gray steel color, you may not wish to use a slammer or Ford puller because this is the 76½ through 78 ignition.

Because of the new anti-theft features, it is difficult to rapidly extract the 76½–78 Ford ignition. For that reason, I suggest removal of the door lock to decode the tumblers and cut a key or picking the lock. The door lock can be impressioned, however, the flat tips on the alloy tumblers make it difficult to impression the ignition. Removing the door lock by the methods previously discussed in this chapter is quicker than impressioning and is a skill easily mastered. On the more expensive Ford, Lincoln and Mercury cars, such as the T-Bird, Lincoln and LTD, etc., the door lock clip is exposed in the jam of the door and can easily be removed in seconds with a screw driver.

The Ford ignition lock can be removed by using a Ford Extractor, a slammer and/or drill in the following methods. I highly recommend Black and Decker's new cordless drill as it is comparatively inexpensive for locksmithing work. The rechargeable battery pack accepts several Black and Decker accessories and you might consider purchasing the spotlight also. The low RPM output of the Black and Decker drill does not break drill bits as often as a high speed drill would in lock servicing. Use only the best carbon steel (carbide drill bits) you can find as they are less apt to break than the "cheapies". If you break a bit while drilling, you have created another obstacal for youself and it is suggested that you practice drilling procedures on old locks before using them in the field.

Ignitions of Ford Motor products with a tilt wheel are easier to remove than others. On the column, near the four way emergency flashers there is a small hole. At the bottom of this hole is the housing retainer pin of the ignition. When the lock is turned or picked to the "on" position, the retainer pin can be depressed with an ice pick enabling you to remove the ignition by pulling it outward with your hand. To remove the ignition in the "locked" position, use a 1/8" carbide drill bit to drill out the housing retainer pin through the access hole. It is important to keep the drill as straight as possible and it is only necessary to drill 3/16" into the housing retainer pin to free the ignition. Another method would be to "punch" the housing retainer pin into the core. Insert a 4" piece of welding rod into the access hole and tap the end sharply with a hammer until the retainer pin is driven forward into the core allowing you to remove the ignition. These methods work well with pre-76½ model Ford ignitions that are not retained by the "switch stud". Pre-76½ year model ignitions can be drilled out in several ways. The first is to remove the



FRONT VIEW OF 76½–UP FORD IGNITION WITH "BUTTERFLY" REMOVED

Fig. 41

chrome knob or butterfly with a pair of channel locks. After removal of the butterfly, remove the anti-rattle pin to the left of the core (marked "A" in figure number 41). After the brass anti-rattle pin has been removed use a broken key extractor from your pick set to remove the small steel spring behind the anti-rattle pin. Using a 3/16" carbide drill bit, drill a hole 1 1/4" long slightly to the left of the anti-rattle pin until the housing retainer pin has been sheared. If you desire, you may use a larger drill bit and drill through the anti-rattle pin cavity. It is then possible to remove the ignition by pulling outward on the chrome knob. If the lock resists, you have not properly sheared the housing retainer pin where it intersects with the shell and the column housing. If you have in fact drilled through the retainer pin, it is sufficiently weakened so that you can extract it with either a slammer or a Ford extractor.

The second method would be by drilling the tumblers. Using a 3/16" carbide drill bit, drill a hole 1 1/8" long through the tumblers at the point where the shell and the core meet (marked "C" in figure number 41). It is important that you keep the drill as straight as possible and do not exert too much pressure on the drill or your bit could break, creating another obstacal. As you drill, you will feel the drill penetrate each tumbler. As you drill through a tumbler, the drill may "surge" and unless you release the pressure immediately, you could break the drill bit. Once you have drilled to the required depth,

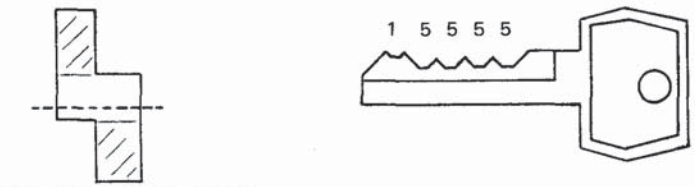
you have created another shear line, allowing you to turn the core or plug to the "start" position. Later, the lock can be extracted in the usual methods. It is also possible to turn the Ford ignition to the "start" position by using a piece of "shim stock" (small strips of metal of ten thousandths thickness or less). After the chrome knob or butterfly has been removed, insert a shim (feeler gauges work nicely) between the core and the shell of the lock at the point marked "C" in figure number 41. Using the curved hook pick, depress each tumbler as you push the shim stock forward with your other hand so that the shim stock separates the top and bottom tumblers. Once each pin has been separated, it is possible to turn the core or plug to the "on" position by inserting a flat head screw driver into the keyway and turning the plug clockwise.

It is possible to shim the 76½ year model Ford ignition as previously described, provided however, that it is not the type that has the "free rolling" steel disk. The free rolling steel disk is usually found only on 1977 and 1978 model ignitions. To shim the tumblers or drill them out, it is first necessary to remove the steel disk by drilling two 3/16" holes into the shell of the lock 1/4" deep on either side of the disk (marked "B" on figure number 41). This steel disk is approximately 5/16" in diameter, so space the holes accordingly. Once the holes are drilled, insert a flat head screw driver between the shell and the column housing (at the point marked "spring retainer" on figure number 41) and pry up to remove the shell covering the steel disk. Be sure that the holes you have drilled have sufficiently weakened the shell so that prying the shell out does not damage the column housing. Once the small portion of the shell has been removed, use a broken key extractor to remove the steel disk and shim or drill as previously described. Once the ignition has been turned to the "on" position, the lock can be extracted by drilling out the column housing retainer pin or by using the slammer or Ford Extractor. Although I have not tried it, it would be possible to drill a 3/16" hole through the keyway 1 3/4" deep to sufficiently damage the switch stud so that the lock could be extracted with the Ford Extractor or slammer. The only problem would be the numerous obstructions in the keyway that would make it easy to break the drill bit without great caution.

As previously stated, drilling a lock takes a certain amount of skill and patience. The deeper you drill into a lock the more difficult it gets, as broken tumblers and other debris are apt to break the drill bit. Caution should be used so that you do not "over drill" and put holes where they should not be. To prevent this, paint marks on your drill bit, or better yet, place small pieces of copper tubing around the drill bit to expose just enough of the drill bit to match the depth of the hole you wish to drill. The copper tubing also helps to strenghten the drill bit making it less apt to break. Ford locks can be "riddle drilled" by drilling 1 3/8" holes with a 3/16" drill in the shell of the

lock above and below the anti-rattle pin cavities at the shell's thinest points.

Generally, only three or four holes are necessary to sufficiently weaken the lock so that the core can be turned and the shell removed "piece by piece". Drill jigs are a good thing to have, as they aid the locksmith in determining where to drill and aid in keeping the drill bit straight during drilling. I have made a set for myself out of wood. After shaping the jigs, I drilled holes in the wood at the necessary drill points and inserted "sleeves" made of copper tubing to protect the drill jigs during drilling. Copper tubing can be held in place by using epoxy or super glue or by slightly flaring the ends of the copper tubing with a punch.



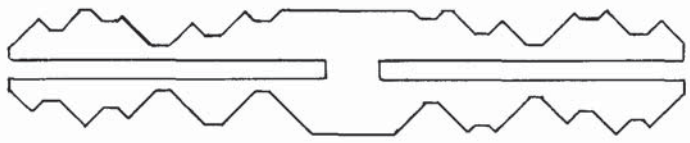
FORD PICK CUT FROM A KEY

Fig. 42

As stated in the first chapter, Ford locks can be easily picked. The handy Ford pick depicted in figure number 42 is easy to make and enables you to pick Ford locks faster than utilizing regular picks. To construct the Ford pick, cut the depths five, five, five, five, one from bow to tip on an ordinary double sided Ford key blank on one side only. Next, grind the uncut blade flush to the guide rib. Then grind an additional 1/16" of the guide rib away, and your Ford pick is ready to use. Insert the key into the keyway and use a raking motion while lifting up and down on the bow of the key. With your free hand grasp the "ears" of the butterfly or chrome knob and apply alternate tension while continuing in and out, up and down, raking and picking until the ignition turns over to the "on" position. Nine out of ten times this Ford pick will turn the ignition over in anywhere from thirty seconds to three minutes. I made several other Ford picks with two, three and four cuts instead of the one cut. Whenever the one cut fails to work as fast as I would

like it to, I progress from the second to third to fourth pick until the lock turns over.

Figure number 43 depicts another set of Ford picks that can be constructed out of old hacksaw blades or banding steel. Using a key cutting machine, any variation or combination of codes can be cut into the pick. The pick should be about six or seven inches in length (please note that figure number 43 only depicts the picking ends - there should be about six inches in length separating the two picking ends so that you can properly grasp the tool). After the picks have been cut to the cuts you desire, file or cut a slot down the middle of the pick. This slot provides some "spring" to the pick. Use an undulating and back and forth motion while applying alternate tension pressure on the chrome knob with your free hand.



FORD PICK CUT FROM HACKSAW BLADES OR BANDING MATERIAL

Fig. 43

Locksmithing Techniques For Chrysler Motors Ignitions

Chrysler Motors utilize three types of ignitions on their late model American made automobles.

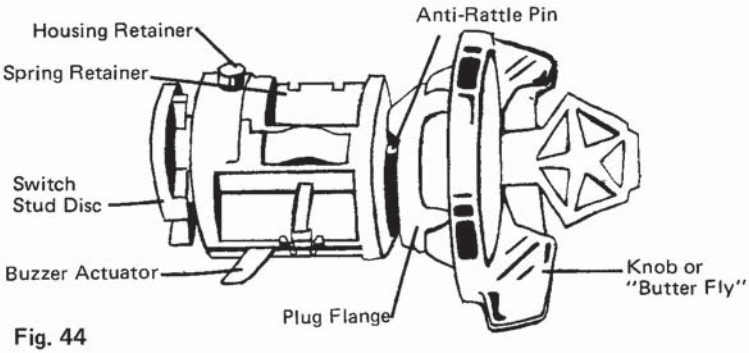


Fig. 44

In 1970, Chrysler came out with their first steering column ignition lock with three way locking. Located on the column, it not only locks the ignition switch but also the steering wheel and transmission as does the Ford ignition previously discussed. This ignition used a half moon retaining disc to hold the cylinder in the housing. For some reason Chrysler discontinued the use of this particular model in 1970 and in 1972 came out with a lock that used a retainer pin to retain the lock in the column (figure number 44). Your author attempted to purchase a 1970 and 1971 replacement lock and found that they are few and far between as they are produced by only one automotive ignition manufacturer. The retaining pin on the 1972 through 1978 and the half moon retainer disc on the 1970 and 1971 ignitions are both spring loaded and protrude into the void of the column housing cavity. The column housing that holds the lock cylinder is made of pot metal (figure number 46).

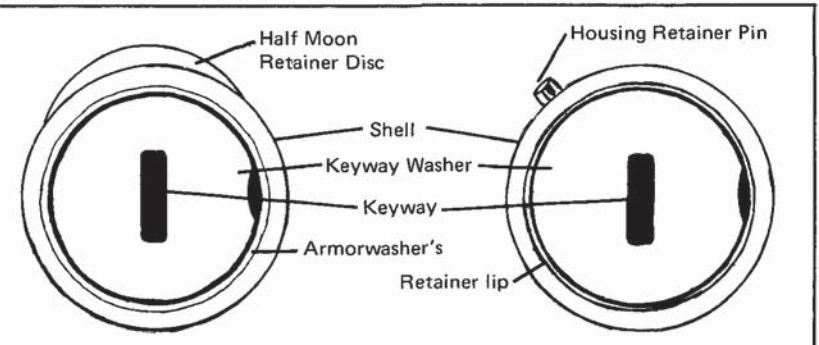
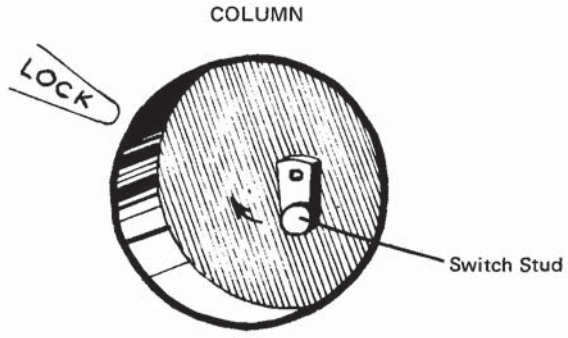


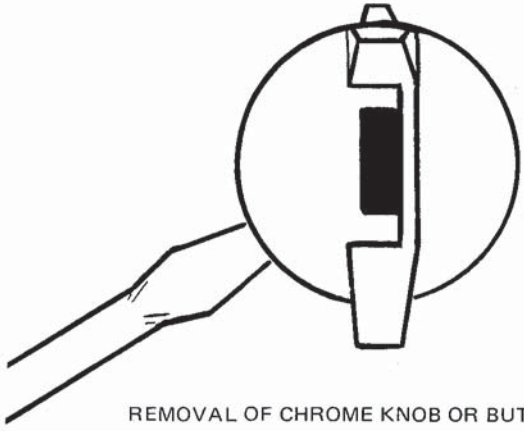
Fig. 45 COMPARISON OF 70 - 71 LOCK AND 72 - UP LOCK



COLUMN HOUSING CAVITY AFTER REMOVAL OF IGNITION

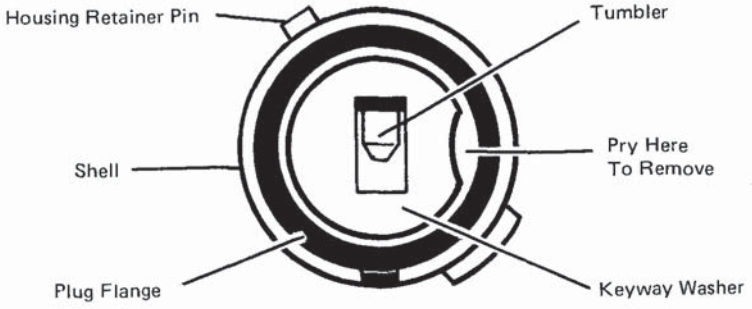
Fig. 46

The 1970 and 1971 locks have an armor washer. The washer prohibits screwing the self-tapping screw of the slammer into the ignition. However, the armor washer can be removed by using a sharp pointed screw driver, after first removing the chrome knob or butterfly with a screw driver (figure number 47). After discovering that the Chrysler ignition has an armor plated washer (usually it has a dull, dark greyish color) take a sharp pointed screw driver and peal away the armor washer's retainer lip by starting at the small slot that is located at the 2 o'clock position of the lock. This operation is easy and can be done with hand pressure without the use of a hammer as the armor washer's retainer lip is of soft pot metal (figure number 48). After the armor washer has been removed place the self-tapping screw of the slammer at the top of the keyway and screw it in no more than 1/2". Otherwise, it will depress the buzzer actuator. When the buzzer actuator is depressed, it



REMOVAL OF CHROME KNOB OR BUTTERFLY

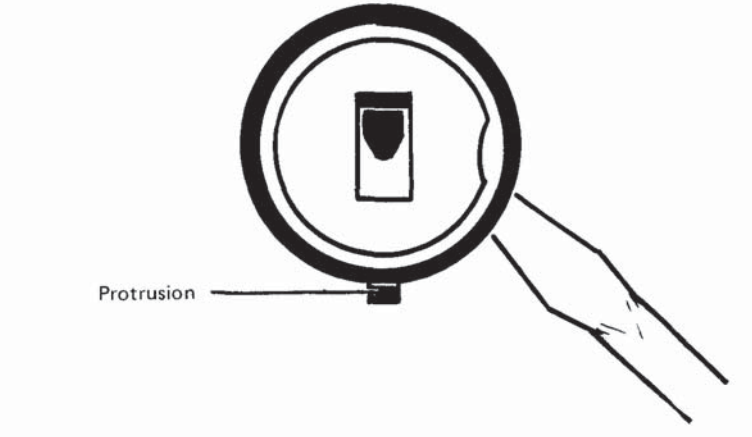
Fig. 47



FRONT VIEW OF CHRYSLER LOCK - CHROME KNOB REMOVED

Fig. 48

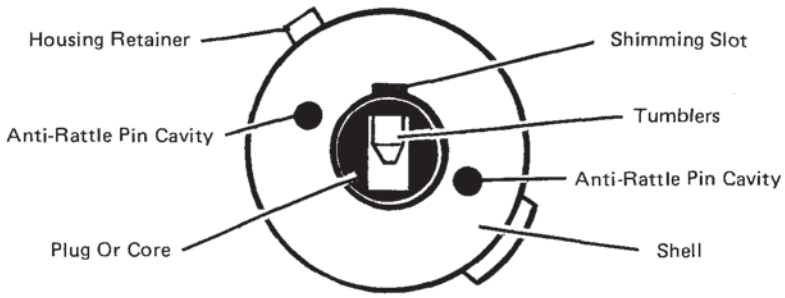
protrudes into the column housing and will help retain the lock during extraction. Occasionally, the tumblers of the lock force the slammer screw downward so that it depresses the buzzer actuator. To avoid this, use a paper clip bent at a 45 degree angle to raise the tumblers with your free hand while screwing the slammer into the keyway. An easier method would be to pry off the plug flange, after removal of the butterfly, by prying upward with a screw driver after placing same between it and the column housing (figure



REMOVAL OF PLUG FLANGE

Fig. 49

number 49). After removal of the plug flange, remove the anti-rattle pin situated at the 10 o'clock position in the shell of the lock (figure number 50). Next, screw the self-tapping screw of the slammer into the anti-rattle pin cavity. It is best to use the anti-rattle pin at the 10 o'clock position as it is closer to the retainer pin and exerts direct pressure on it during extraction.



CHRYSLER IGNITION WITH PLUG FLANGE REMOVED

Fig. 50

After the self-tapping screw is in place, extract the lock by slamming away as hard as possible, keeping the slammer as straight as you can. A quieter and more professional method would be to use the Ford Extractor depicted in the previous chapter instead of the slammer.

The 1972 through 1978 Chrysler ignition usually does not have an armor plated washer, and appears to be made of a chrome colored alloy. It still can be difficult to screw the slammer and the Ford Extractor into this washer and it can be removed in the same manner as the 1970 and 1971 washer.

Neither of these locks slam easily. Oftentimes, it is necessary to slam the ignition as many as ten times. For that reason, I would suggest using the Ford Extractor or Chrysler Extractor. Occasionally, the column housing is damaged during extraction at the point where the housing retainer pin fits into same, especially when using the slammer. When this happens, the replacement lock will not fit properly, (the hole in which the housing retainer fit is "torn" allowing the lock to move backward and forward with about 1/4" play). If this happens, put a few drops of super glue on the shell of the lock so that it adheres to the housing itself.

Standard Chrysler (pin type) ignitions can be easily "shimmed". Remove the plug flange with a screw driver as previously described. Next cut a piece of shim stock of .005 thickness (feeler gauges work well) 2" in length and slightly less than 1/8" in width. Insert the shim in the slot of the shell above

the pins depicted in figure number 50. Next insert your curved hook pick, that is available in most pick sets, into the keyway and press each tumbler up while pushing forward on the shim stock with your free hand. One by one, you will be able to separate each tumbler at the shear point. After the shim has traveled into the lock approximately 1" deep, all the pins have been shimmed. Next, use a small screw driver or tension wrench and insert same into the keyway and apply a clockwise tension. The core should turn slightly. It is then necessary to use the hook pick to depress the buzzer actuator at the bottom of the keyway so that the core or plug will turn. After some practice, it is possible to shim the lock in less than one minute. Later, the lock can be extracted in any of the methods previously discussed. Another method of shimming would be to utilize shim stock of .0025 thickness and insert same between the core and the shell above the tumblers. The width of the shim stock should not exceed 1/2". Use the same method as described above to pick each tumbler and shim the lock. When shimming or picking any lock, a small shot of WD-40 helps loosen gummed-up tumblers.

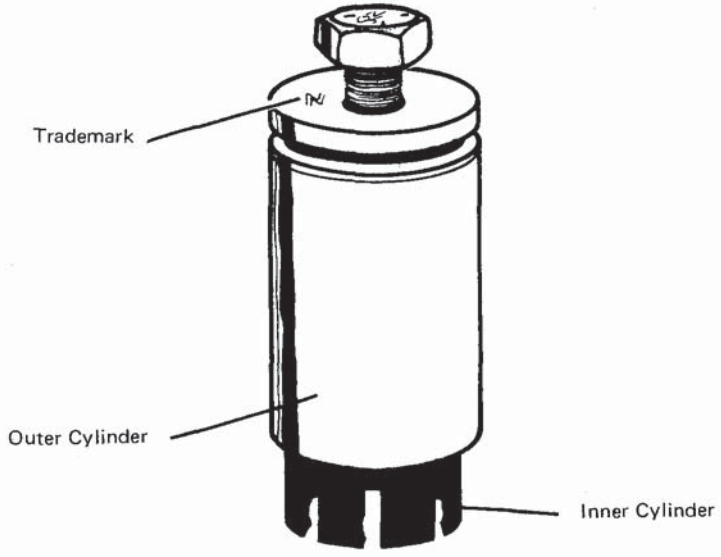
Standard Chrysler locks are easy to pick and I have had great success with curved hook picks and the Lock Aid Pick Gun, the latter is especially good for trunk and door locks.

A new shear line can be drilled into the plug and shell to enable you to turn the ignition to the "start" position. Using a 3/16" carbide drill bit, drill a hole 1" long at the "shimming slot", (figure number 50) so that the drill cuts into the shell and the core. After you have drilled the hole and removed the debris, place a small screw driver or tension wrench in the keyway of the core and turn clockwise to the "start" position. Remember to depress the buzzer actuator so the core or plug will turn freely. Remove the lock later in the methods previously described.

Perhaps the easiest method of extracting Chrysler ignitions is by utilizing a Chrysler Extractor. To operate the Chrysler Extractor, the chrome knob or butterfly is removed and the inner cylinder of the Extractor is snapped onto the plug flange. The inner cylinder consists of eight splines or fingers with "grabbing hooks" that are contoured to the shape of the Chrysler plug flange. After the inner cylinder is securely in place, an outer cylinder is placed around the inner cylinder and the lock can be ratcheted out in under a minute! There are several Chrysler Extractors on the market and you should use caution when purchasing same. Many of them are poorly constructed and may cause the plug flange to come off instead of extracting the ignition! Sometimes this happens anyway, as the core and plug flange of the lock are constructed of low grade pot metal. Allowing the outer cylinder of the Extractor to rotate during extraction also breaks the plug flange. At the bottom of the keyway on the plug flange, there is a small protrusion that keeps the chrome knob or butterfly from rotating during normal use (figure number 49). When attaching the inner cylinder to the plug flange, this protrusion fits inbetween the splines. During extraction, if the outer cylinder is not held securely with your free hand, this protrusion will catch on the inner cylinder splines, rotating the plug flange and causing it to break off. It is amazing to me that this is not mentioned in the instructions of most of the Chrysler Extractors on the market. For that reason, before purchasing a Chrysler Extractor or any other Extractor, it might be wise to write to the

manufacturer and ask them to send you a set of instructions for your review prior to purchasing their tool. If they are not clear, illustrated, easy to read and understand, chances are the tool is a "bummer".

Figure number 51 depicts the Chrysler Extractor that I developed. To combat outer cylinder rotation, this tool uses a thrust bearing (not pictured)to relieve torque. Accompanied with the Chrysler Extractor are a number of small self-tapping sheet metal screws that can be screwed into the keyway prior to extraction to strengthen the plug flange or to reattach the plug flange to the lock if accidentally broken off. After the ignition has been extracted, turn the switch stud depicted in figure number 46 to the left with your finger or a screw driver to start the vehicle.



CHRYSLER "Z-TOP"® EXTRACTOR BY RUSSELL & RUSSELL

Fig. 51

Another method of removing or extracting the 1970 and 1971 Chrysler lock is by using a .005 or .006 automotive feeler gauge. First it is necessary to remove the chrome knob or butterfly (figures number 47 and 52). Next, insert the feeler gague between the shell of the lock and the column housing to a depth of approximately 1 3/4 " at the 4 o'clock position (figures number 53 and 54). Then rotate the exposed end of the feeler gauge as though the exposed end was on a pivot, counterclockwise to the 11 o'clock position (figure numer 55). This action depresses the "half-moon" retainer disc of the ignition allowing you to extract it with a broken key extractor. Insert the broken key extractor into the keyway so that it "grabs" the tumblers, and pull the lock toward you. If the retainer has been properly depressed, the lock should come out. If you have trouble grasping the lock with the key extractor, pry the lock out with a screw driver. A piece of metal measuring tape can be substituted for the feeler gague, and the curved shape of the measuring tape fits the curved shape of the ignition lock well. It was rumored that auto theives were using "butter knives" to remove this type of ignition in the above manner and I presume that is the reason for discontinuing it.

The Chrysler Tilt-Wheel Ignition

Chrysler also utilizes a lock similar to the 1969 General Motors ignition on models having a tilt-wheel. Any of the methods discussed in the next chapter can be used to remove this ignition. After extraction of this ignition, use a pair of needle nose pliers and turn the stud clockwise to start the vehicle.

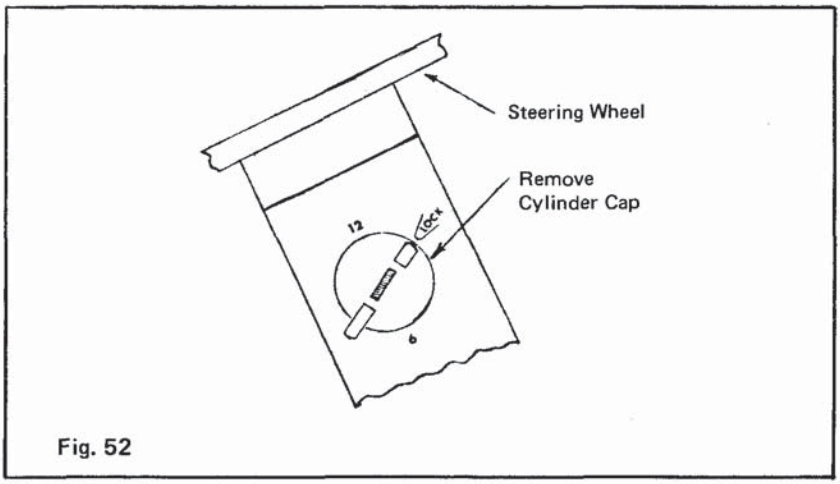


Fig. 52

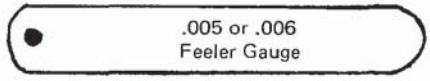


Fig. 53

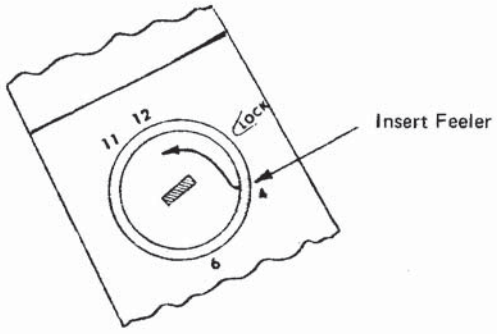


Fig. 54

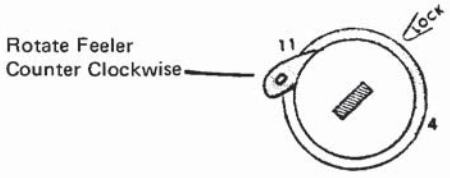


Fig. 55

Chapter III

GM, AM and Chrysler Tilt Wheel

As previously discussed in this book, the above three ignition systems all utilize a side bar lock. The side bar lock is a modified wafer tumbler system, employing five or six discs depending upon the type, in a series. This type of lock was first introduced in 1935.

Figures six through nine in Chapter One show the principles of operation of the side bar lock. The V notch of the wafer tumbler must be lined by the cut of the key so that the V shaped side bar will fit into it. When this happens, the side bar is clear of the shell, and the plug may be turned.

Cutting Keys By Removing The Tumblers

A standard locksmithing procedure for the servicing of American Motors, Chrysler Motors and General Motors automobiles and trucks, is the removal of and the decoding of the door lock to duplicate the ignition key. Most Chrysler Motors and General Motors vehicles allow easy removal of the door lock by methods discussed in Chapter Two. American Motors vehicles have some models wherein the door lock is encased in the handle mechanism making rapid removal difficult.

Chrysler cars having the side bar lock, have the standard pin type door lock sets, and they can be decoded in the same way any pin tumbler lock can. This is not true with the General Motors lock or American Motors door locks. General Motors have side bar locks and American Motors have "wafer" tumbler locks.

Reading The Tumblers On The GM Door Lock

The General Motors door locks differ from Chrysler and Ford in that the tumblers are inaccessible without breaking down the lock. In Ford and Chrysler, there are retainer clips on the shell of the door lock that allow easy access to the pin tumblers. On General Motors it is necessary to remove the chrome dust cover so that you can get to the plug that holds the tumblers (figure number 56).

In 1974, General Motors discontinued coding the door locks to the ignitions. Instead, they coded the door locks to the trunks, making the door lock removal method obsolete.

The face cap or dust cover on the General Motors lock is pressed on, and a little effort is needed to remove them. I designed a tool out of an old pair of needle nose pliers that you could use just like a bottle cap opener. The cap will come off easily without the danger of cutting your fingers (figure number 57). Another method of removing the dust cover is by utilizing a pair of bolt or nail cutters as discussed in Chapter Two.

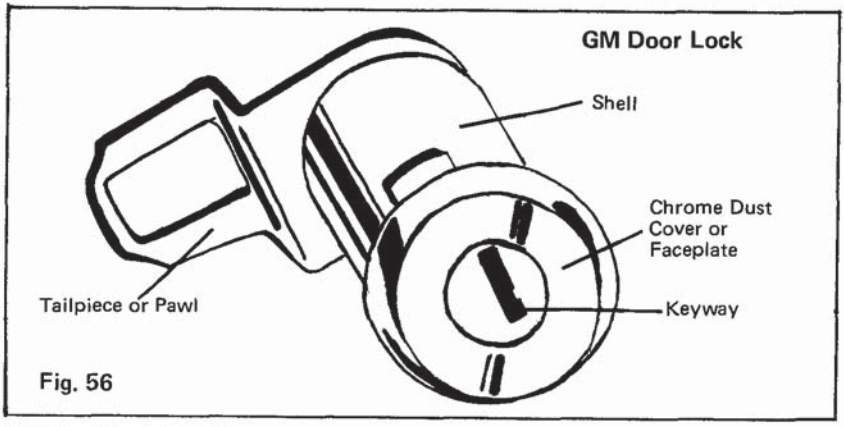


Fig. 56

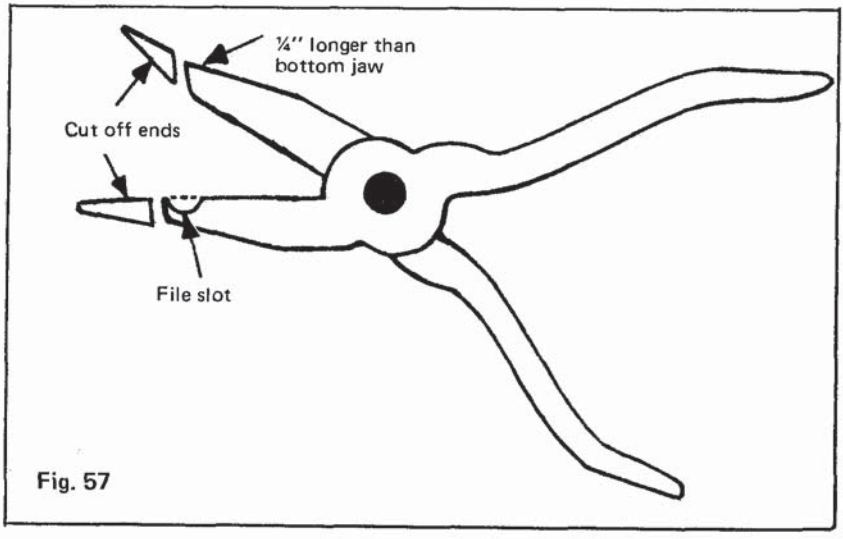


Fig. 57

After you have removed the plug from the shell remove the side bar so that you can see the side bar discs. This is very easy to do as the side bar is only lightly staked into the plug. Take the correct blank for the particular lock, and put it into the keyway. Then look at the side bar discs. A number one cut on a General Motors lock is no cut at all, and if there are any number one cuts, the V slot will be directly in the center of the opening where the side bar once fit. The object is to cut the key until all of the V slots in the side bar discs align in the middle of that opening. If you have depth keys for each year and model of General Motors, it will be somewhat easier to figure out the cuts. If you are using a file, file slowly a little at a time until the cut is deep enough to hold the point of the V slot directly in the center of the opening made by the removal of the side bar. Check your work carefully as you file and do not go too deep. After you have succeeded with one disc perform the same filing procedure for each of the other five discs. When you have completed the work, replace the side bar. If your key is accurate the

side bar should snap into the discs and thus permit the plug to turn (figure number 58).

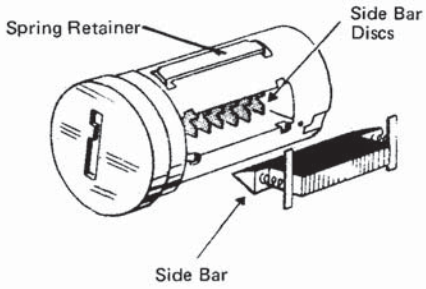


Fig. 58

Another much easier method is to use a set of General Motors decoder gauges. Hand hold the plug so that your fore finger is exerting pressure on the side bar. Rake the tumblers through the keyway with a picking tool all the while keeping pressure on the side bar. It is probable that the front wafer will fall into the open position first and that the side bar will tilt inward. With further raking, the other wafers will move into the open position and the side bar will become fully depressed into the V slots of the side bar discs. It is important that you keep it there (figure numbers 59 and 60).

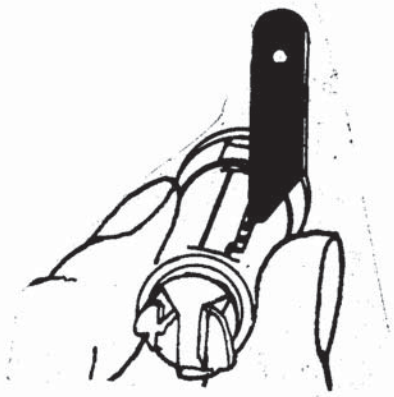


Fig. 59

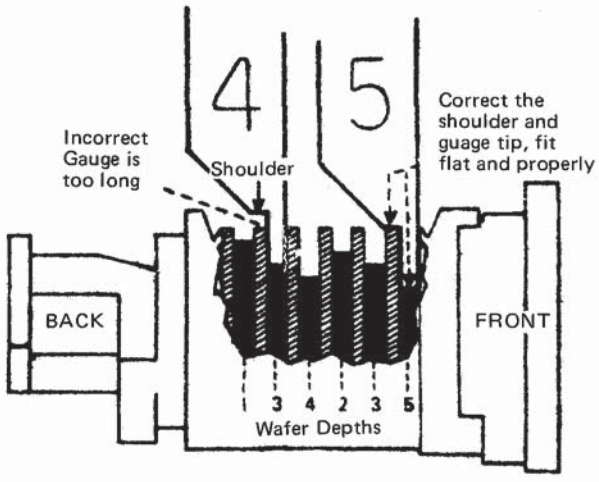
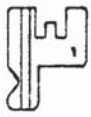
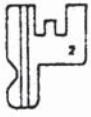
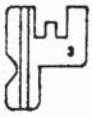
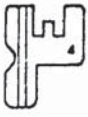
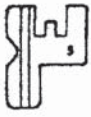
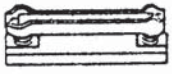


Fig. 60

Look down into the square holes at the side of the spring retainer where the wafers are visible. The wafer tops can be seen sitting at various levels. To begin decoding, start with the first space position (closest to the front of the plug). Use the longest gauge (number five) and work your way down to the shortest one, whose shoulders lie flat on the surface of the divider walls. These dividing walls are indicated in the diagram above by the diagonal lined areas.

It is important that you do not pass up the correct gauge, because the shoulder of all gauges shorter than the correct one will also lie flat and appear to be correct. Repeat the above procedure for all six tumblers and then cut a key by utilizing a file or key cutter.

GM WAFER OR DISC TUMBLER SYSTEM

Tumbler No. 1 	Tumbler No. 2 	Tumbler No. 3 
Tumbler No. 4 	Tumbler No. 5 	Tumbler Spring
Tumbler Spring	Side Bar Assembly 	Face Plate "Dust Cover"
Spring Retainer		Fig. 61

Reading The Tumblers On American Motors Door Locks

As previously discussed, some American Motors door locks are difficult to remove with any of the quick methods. It is necessary to remove the panel, and pull the lock. When the lock is out remove the tail piece (the L shaped metal piece at the base of the lock used for acuating the lock button) and look down the hole in the back. The original factory locks have the depth numbers stamped on each wafer. Using a pin light and a pick, you can raise the tumblers one at a time and read the numbers from them. Reverse the numbers, as you are reading the last cut first, cut the key by using a file or key cutter. (Figure number 62.)

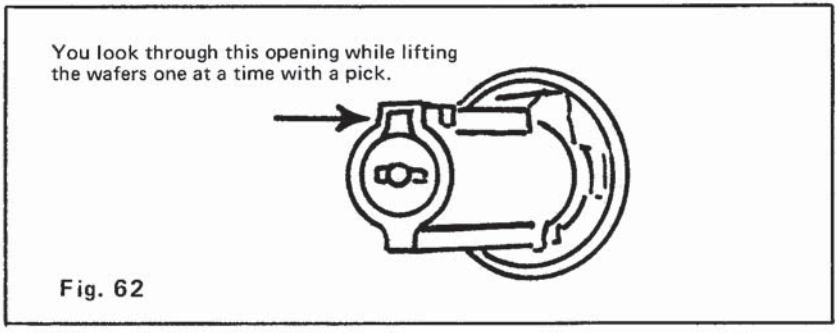


Fig. 62

Locksmithing Techniques For General Motors, American Motors And Chrysler Tilt Wheel Ignitions

In 1969 General Motors introduced an ignition lock with three way locking. Located on the steering column, the new lock not only locked the ignition but also immobilized the steering wheel and transmission. The thought was that a would be thief might start the engine by crossing the wires, but would be prevented from stealing the car by the inability to put the vehicle into gear and turn the steering wheel. Chrysler, Ford and American Motors followed suit in 1970 with their own locked ignitions. American Motors, and Chrysler on the tilt wheel model, utilize a lock similar to the 1969 General Motors ignition lock (figure number 63).

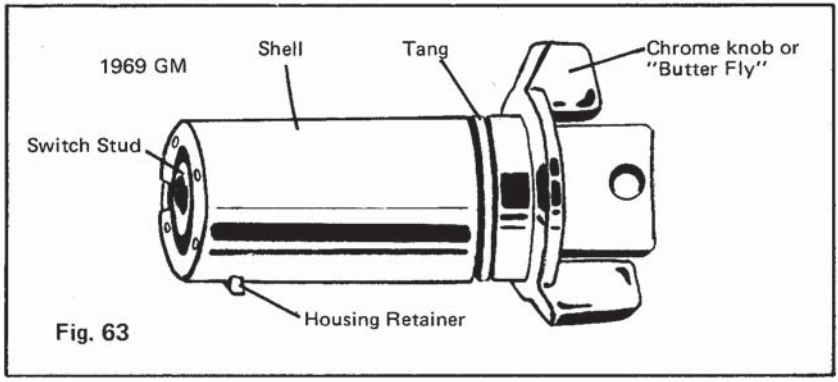


Fig. 63

In 1970, General Motors modified their ignition lock by changing the design on the shell housing around the switch stud (figure number 64). Figure number 65 is an exploded lock view of the 1969 ignition.

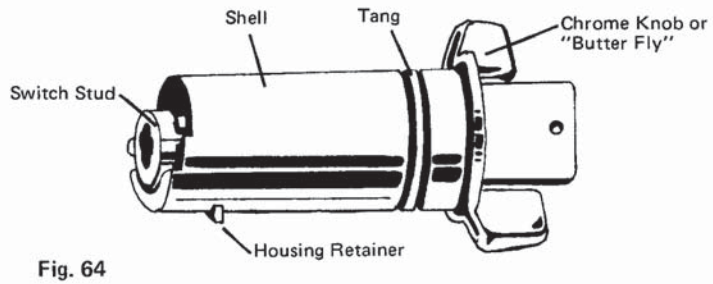
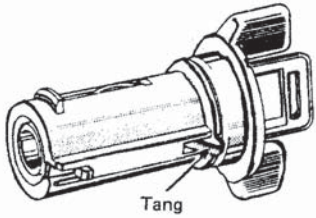


Fig. 64



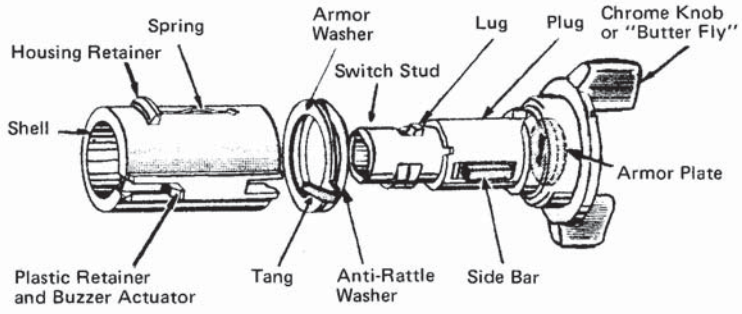


Fig. 65

In 1977 General Motors again changed their ignition lock by altering the design and diameter of the plug flange. In years previous to 1977, the plug flange diameter was approximately 7/8". The plug flange diameter of the 1977 and up is now 1 1/8". Figures number 66, 67, and 68 depict the plug

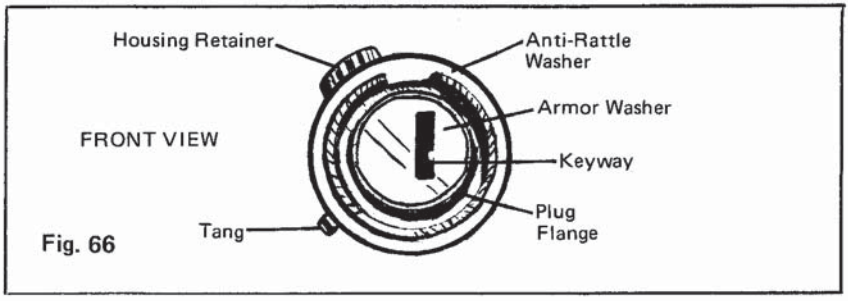


Fig. 66

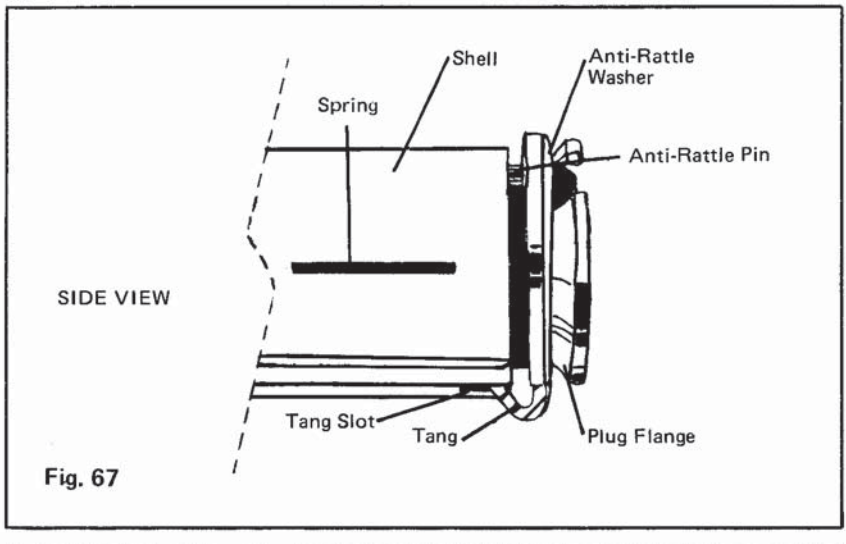


Fig. 67

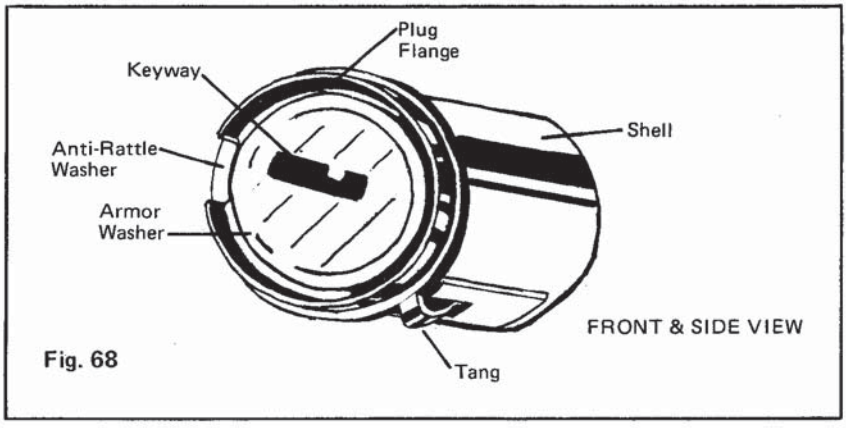
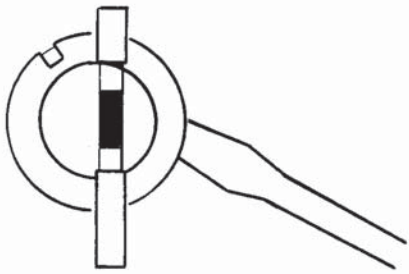


Fig. 68

flange of 1969 through 1976 General Motors ignition, the 1970 and up American Motors ignition and the 1970 and up Chrysler Motors tilt-wheel ignition from various veiw points after removal of the chrome knob or butterfly. To remove the chrome knob or butterfly, insert a screw driver between it and the column housing to pry it off (figure number 69). After the chrome knob has been removed and the plug flange is exposed, the ignition can be extracted in several methods.



REMOVAL OF CHROME KNOB OR BUTTERFLY

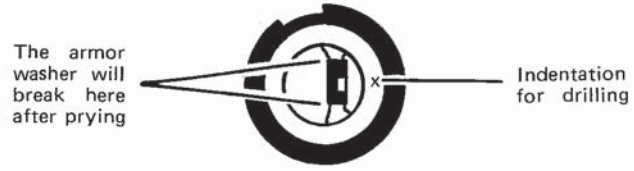
Fig. 69

The first is by utilizing the slammer or Ford Extractor. To enable you to use these tools, it is first necessary to remove the armor keyway washer. By inserting a flat head screw driver into the keyway and prying up and down, the armor washer can be broken out in a matter of minutes. I suggest using Sears Craftsman 1/4" forged screw drivers as they will be gladly replaced by Sears if the tips break. These screw drivers come in two shaft lengths. Get both, to determine which works best for you. In prying out the armor washer with a screw driver, the object is to break the washer at it's weakest points at the top and bottom of the keyway. Do not pry side to side, as you will break the screw driver. Once the washer is broken at the top and bottom of the keyway, a slight side to side motion will break out a portion of the armor washer to the left of the keyway. With that portion of the armor washer removed, the self-tapping screw of the slammer or Ford Extractor will easily bite into the keyway allowing you to extract the ignition in the methods prescribed for those tools. An easier and more professional method of removal of the armor washer is by utilizing a drill jig and a hole saw. A 3/4" hole saw without an arbor (a guide drill) will enable you to drill away the small pot metal lip incasing the armor washer in less than a minute. It is not necessary to completely remove the pot metal lip as a slight amount of drilling will allow you to pry out the armor washer by inserting a screw driver in the keyway. To get best results, make sure that the inside hole of the drill jig is slightly larger than the 3/4" hole saw and that it is properly aligned with the armor washer. Black and Decker's cordless drill has sufficient power to

allow you to drill out the armor washer. I would suggest that you purchase two of the rechargeable battery packs for emergencies or if you plan to do a lot of drilling.

The next method is to pry away the plug flange piece by piece by placing a screw driver between it and the column housing. By using a "can opener" motion as you pry up on the plug flange, the lip of the plug flange can be removed. Once this lip is removed, you are able to remove the anti-rattle and tang washers. With the anti-rattle and tang washers removed, the tang slot (refer to figures number 66 and 67) is exposed. Screw the self-tapping screw of the slammer or Ford Extractor into the tang slot at a slight angle so that the screw bites into the plug and the shell. It is then possible to extract the lock in the usual methods.

Another method is by drilling a small hole into the plug flange at a 45 degree angle. Around the armor washer there is a slight indentation. Figure number 70 depicts the approximate location of the indentation at the point marked "X" (please bare in mind that a hole can be drilled anywhere in this indentation and not specifically at the point marked "X"). Use a 3/32" carbide drill bit to drill a hole 1/2" into the plug flange and the core of the lock. By angling the drill bit 45 degrees, the drill will miss the armor washer and penetrate the core of the lock. After the hole is drilled, insert the self-tapping screw of the slammer or Ford Extractor into the hole and extract the ignition in the usual method.

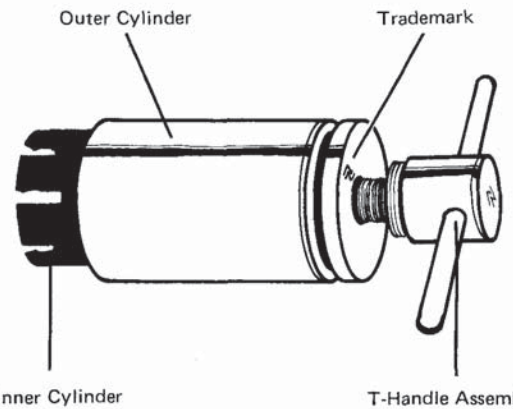


FRONT VIEW OF PLUG FLANGE AFTER REMOVAL OF CHROME KNOB

Fig. 70

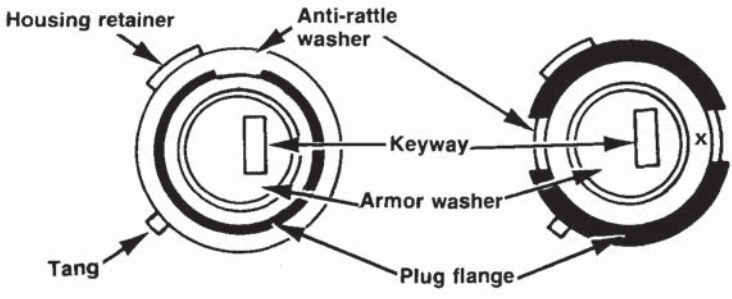
Perhaps the easiest method of extracting the pre-1977 General Motors ignition, the 1970 and up American Motors ignition and the 1970 and up Chrysler tilt-wheel ignition is by utilizing the General Motors Extractor. To use this tool, the chrome knob is removed and an inner cylinder is snapped onto the plug flange. Once the inner cylinder is secure, an outer cylinder is placed around it, and the lock is ratcheted out in short order. As I have pointed out to you previously, there are several manufacturers of Extractors. Some of their products are good and others are not. The main problem with most of these Extractors is that the manufacturers do not take into account that the

diameter of the plug flange of the ignition differs from model to model. Because of this, the design of the "grabbing hooks" of the inner cylinder is critical. Most of the tools on the market use a simple 90 degree bend in the inner cylinder to form the "grabbing hooks". If you will closely examine the plug flange of the General Motors ignition, (and similar ignitions), you will notice that the flange has a slope or is angled on the back portion where the "grabbing hooks" fit. Because of this angle, those Extractors using a 90 degree hook design cause the plug flange to collapse and the ignition to stay intact in the column. Once the flange collapses, the Extractor will not work. Most manufacturers do not heat treat the inner cylinder and even if the grabbing hooks are properly designed, they wear out or break off after a while. Most of the Extractors examined have outer cylinders that are too long allowing the operator to over tighten the tool during extraction. Over tighenting causes the plug flange to break, the binding of the lock in the housing, the breakage of the grabbing hooks and extraction of the core of the lock leaving the shell intact. My harping on the imperfection of my competitor's Extractors, is not for the soul purpose of pointing out the many advantages of purchasing the tools that I have designed. My specific purpose, is to point out to the consumer what to look for when purchasing a tool. Sales of my products have been affected by the imperfections of our competitor's products, making the consumer wary of utilizing any Extractor. Below is a General Motors Extractor that we developed (figure number 71) that is guaranteed to work and will be replaced if defective. The model depicted uses a T-Handle that precludes the use of a ratchet wrench. As with our other tools, we have made them as completely "fool proof" as possible, as they were developed for the repossession industry. Because many in the repossession industry practice "involuntary repossession", the failure of a tool could cause a serious problem for the repossessor.



GENERAL MOTORS "Z-TOP"® EXTRACTOR BY RUSSELL & RUSSELL

Fig. 71



DIFFERENCE IN PLUG FLANGE

Fig. 72

In 1977 General Motors altered the design of the plug flange of their ignition. Figure number 72 depicts the change in design. The plug flange is wider, to impede the use of the 1970 through 1976 General Motors Extractor. General Motors did not appreciate the fact that their so called "high security" lock cylinder could be defeated so easily. General Motors also noted that there had been an increase in the sale of replacement sleeves (the shell) used by locksmiths and repossessors to repair ignitions extracted with the General Motors Extractor. For years, General Motors had offered these sleeves to locksmiths for approximately seventy five cents apiece, and although the sales were up because of the Extractors, the sales of their ignitions dropped. Subsequently they altered the design of the plug flange and discontinued marketing replacement outer cylinder sleeves. General Motors then circulated propaganda to the effect that replacement outer sleeves would not properly align with the extracted plug and therefore, should not be used. They also advised locksmiths that the use of Extractors could cause damage to the column housing during extraction. Puzzled by why General Motors would take such serious exception to Extractors, I contacted their Steering Gear Division in Detroit. I was advised that General Motors was not concerned with the use of Extractors by those in the repossession industry, but was concerned when Extractors began to be sold to locksmiths. They explained that it is their contention that auto thieves use the cover of professional locksmiths, and that the tools would "get into the wrong hands".

To set the record straight, replacement outer cylinder sleeves have no alignment problem. If properly used, with the exception of the Chrysler Extractor, Extractors do not cause damage to the column housing. As to locksmiths being auto thieves, well I can only speculate that there may be some truth to this, but I do not feel that General Motors should have the audacity to con-

vict the whole profession for the actions of a certain few.

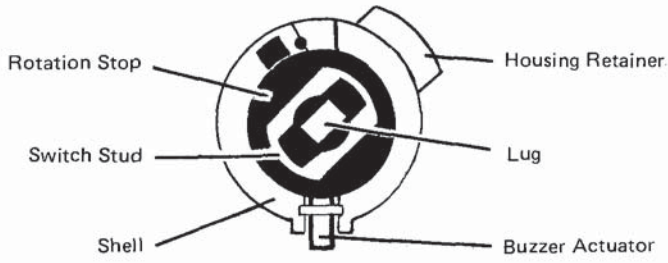
Several months after the 1977 ignition was introduced, several manufacturers introduced a 1977 General Motors Extractor. These Extractors utilize a series of small "fingers" that must be inserted one by one or two by two around the plug flange. Once these "fingers" are properly positioned, the ignition can be extracted in a similar manner as the pre-1977 Extractor. These tools will work, however, the larger flange of the 1977 and up ignition can occasionally break off leaving the ignition intact. I tried to develop a tool of similar design and found that the flange would break occasionally regardless of the design of the fingers. Because the plug flange is wider, during extraction, the flange collapses as more pressure is exerted against it during extraction. It is much like the karate expert that is able to break a 4' two by four with his hand but could not and would not attempt to break a 1' two by four without the use of a five pound hammer. Because of these problems, I have been unable to develop a tool using fingers or an inner cylinder that is a hundred percent effective in extracting the ignitions.

To extract the 1977 and up General Motors ignition, the methods described for extracting the 1969 through 1976 General Motors ignition can still be used. In other words, the armor washer can still be removed with a screw driver, the flange can be drilled and/or broken off, as previoulsy described in this chapter. I have developed a drill jig for removal of the armor plated washer so that the Ford Extractor can be used to extract the ignition and another tool that breaks the armor plated washer out in the same fashion as a screw driver. I suggest using any of these procedures for servicing 1977 and up General Motors ignition.

Disassembly of the 1970—UP General Motors Ignition

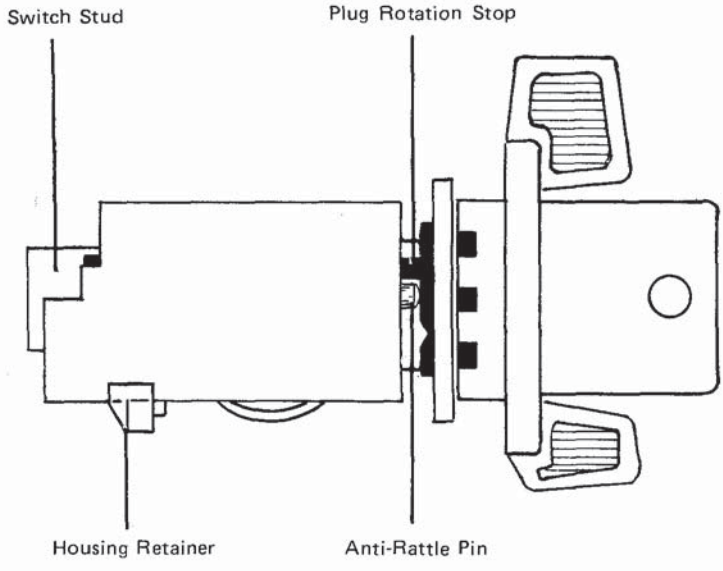
As previously mentioned, extracted ignitions can be repaired by using a replacement outer sleeve. Although General Motors no longer produces these, one major ignition manufacturer still does.

To disassemble the 1970 and up General Motors ignition, the "rotation stop" staked onto the switch stud at the base of the ignition must first be removed. To remove the "rotation stop", place a screw driver between it and the shell of the ignition and pry up. Use caution during removal so that the "rotation stop" is not broken (figure number 73). Next by using a key, turn the ignition to the "accessory" position, to the left (it is necessary to have a key for this operation, the key code is located on the shell of the extracted ignition). With a paper clip or ice pick, depress the anti-rattle pin that is closest to the housing retainer. While depressing the anti-rattle pin, continue to turn the lock to the "accessory" position so that the "plug rotation stop" travels over and past the anti-rattle pin being depressed (figure number 74). Pull back on the key and you should be able to remove the plug. Should the plug resist, it indicates that the plastic retainer—buzzer actuator is binding against the lug (figures 65 and 73). To combat this, make sure that the buzzer actuator is fully extended and if not, pull same downward with your fingers. Next use your ice pick to push up on the lug through the opening in the switch stud. The plug should then come out without any further problem. To reassemble the lock, align the side bar to the tang slot (figure number 65). Once the plug is secure in the replacement shell, reattach the "rotation stop".



REAR VIEW OF THE 1970–UP GENERAL MOTORS IGNITION

Fig. 73



SIDE VIEW OF THE 1970–UP GENERAL MOTORS IGNITION

Fig. 74

Chapter IV
General and Miscellaneous Information

Key Code Information

Key code information can be obtained by calling the title clerk at the dealership where the vehicle was originally purchased. Give the title clerk the name of the owner, the serial number and when the vehicle was purchased. The clerk should be able to pull the contract and give you the key codes.

On used cars where it is impossible for you to know who the original dealer or purchaser was, contact the Department of Motor Vehicles in title states, give them the serial number and they should be able to give you the name of the orignial purchaser and the original dealer. Then contact the title clerk at the original dealership as you would with a new car. This is true of all American made automobiles and trucks with the exception of Chrysler trucks as this information is not listed on the original contract.

Be sure to check the glove box for a warrenty book, the key codes are some times written on the first or second page of same.

A factory "quality control" listing sheet can be found under the springs of the driver's seat or under the carpet on the driver's side of most American made automobiles occasionally, they list the key codes on same.

American Motors

If you are on good terms with a title clerk at an American Motors dealership, it is possible to give them a serial number and have them contact the factory regarding the key codes. The key codes are cross indexed on a computer with the serial number and they can usually produce the key codes for cars manufactured as late as 1973. American Motors does not publicize this fact as the service is designed for their dealers only, so bear this in mind when trying to obtain this information. It is possible that the other major automobile manufacturers also have this same type service, but I have been unable to verify same.

Ignition key codes for American Motor's Products can be found on the shell of the ignition. Very rarely are the key codes located on the door lock. Trunk key codes can usually be found on the plug of the trunk lock. The trunk key code is usually on the plug of the glove box as are General Motors Products.

Chrysler Motors

Ignition key codes for Chrysler Motor's Products are located on the shell of the ignition and on 1970 and 1971 vehicles can be found on the passenger side door lock. Occasionally, key codes can be found on the glove box

lock of Chrysler Products. Some glove box locks for Chrysler products have only four tumblers. These are the last four tumblers from bow to tip and it is necessary to use trial and error to decode the first two cuts. Occasionally, the key codes for the trunk can be found on the shell of the trunk lock.

Ford Motors

Ignition codes for pre-1972 Ford Motor's Products can be found on the door lock on the passenger's side. Occasionally, they can be found on later year vehicles on the passenger door lock. The ignition code is rarely stamped on the extracted ignition. Trunk key codes for Ford Motor's Products are located on the back of the shell of the glove box lock. You can use a mirror to read same or it can be easily removed. Trunk key codes are usually found on the shell of the trunk lock.

General Motors

Ignition key codes for General Motor's Products from 1974 down can usually be found on either door lock or on the shell of the extracted ignition. Trunk key codes can be found on the plug of the glove box lock. When trying to remove the plug from the shell of the glove box lock, open the lid of the glove box and turn the opening knob to the left. Pull back the lock latch and pick the lock to the locked position, (usually to the left) this will put the lock retainer directly in front of you and it can then be pushed through the poke hole to allow the lock to come out.

By removing the rubber bumper in the jam of the door or by drilling or punching a hole in the jam one is usually able to see the key code for the ignition on General Motors Products 1974 and down.

Foreign

On the following foreign automobiles the key codes can be found on the shell or core of the ignition: Jaguar; Triumph; Capri; Volkswagen; Fiat; Chevrolet LUV; Ford Courier; Datsun (pre-70); Subaru; and Toyota.

The following foreign automobiles have the key codes for the door lock on the shell, pawl or core of the door lock: Opel; Porsche; Fiat; Dodge Colt; Honda; Cricket; Triumph; Mazda; Toyota and Volvo.

The key codes for the Volkswagen door lock are located on the door handle as are the codes for Renault, Capri and Mercedes Benz.

Vehicles with trunk key codes on the trunk lock are: Mazda; Dodge Colt; Toyota; Volvo; Capri; Mercedes Benz; Triumph and Opel.

It is often possible to find the key codes for the glove box, door and trunk locks on the glove box lid of Capri, Datsun and Audi vehicles.

On the hood release of the 914 Porsche, located under the dash on the driver's side, there is a cylinder which locks it. In the unlocked position only a set screw holds the cylinder plug in. When the cylinder plug is re-

moved, a key can be quite easily made from the code on same that will work on the ignition, door and trunk.

The door handle mechanism on a Volkswagen "Bug" can be easily removed by unscrewing the screws that are in the door jam under the weather stripping near the lock mechanism. The key codes are stamped on the back of the door handle.

Key codes for Mercedes Benz vehicles can be obtained by calling your local dealer. They have a cross reference book with serial numbers and key codes on all Mercedes Products.

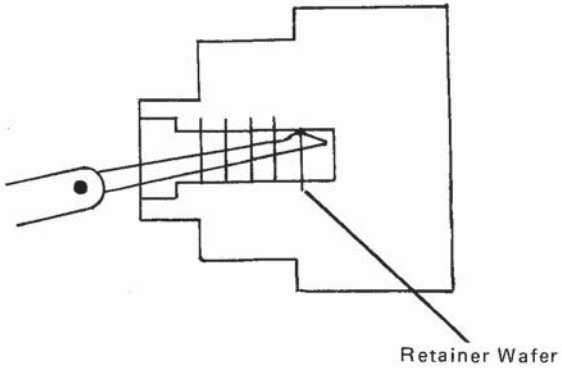
Fiats usually have key codes in warrenty books.

Gas tank locks of some foreign cars are keyed to the ignition and the code is stamped on the shell of the gas tank lock or on a paper tag on same.

Some of the information above may be inconsistant as key code locations vary from year to year and model to model, however, most of this information is correct and worth checking into.

Japanese Motorcycles

The lock cylinders in most Japanese motorcycles use five wafer tumblers. The core or plug of the lock is secured into the outer cylinder or the shell by using a retainer wafer at the bottom of the plug. To remove the core or plug, insert a diamond tipped pick into the keyway and pry up on the retainer so that the plug will be released (figure number 75). Use caution as the wafer tumblers are loose and can be easily lost. Most Japanese motorcycles also have the key codes stamped on the face plate of the ignition.



REMOVING THE PLUG OF JAPANESE MOTORCYCLES

Fig. 75